

U.S. DEPARTMENT OF THE INTERIOR  
U.S. GEOLOGICAL SURVEY

CORE LITHOLOGY  
STATE OF HAWAII  
SCIENTIFIC OBSERVATION HOLE 2  
KILAUEA VOLCANO, HAWAII

BY

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## INTRODUCTION

The Scientific Observation Hole (SOH) project was initiated by the State of Hawaii through a contract with the Research Corporation of the University of Hawaii. It was a series of three deep cored holes, one in the middle east rift zone (MERZ) and two in the lower east rift zone (LERZ) of Kilauea volcano. The original core log sheets and drill core from all the SOH holes are now archived at the University of Hawaii at Manoa.

Scientific Observation Hole #2 (SOH#2) was spudded-in on February 3, 1991 and completed to a total depth of 2,075 m (6,802 ft) on May 29, 1991. The hole was located at an elevation of 85.4 m (280 ft) in the Kapoho area of the LERZ (Figure 1).

## LITHOLOGIC SUMMARY

Due to difficult drilling, conditions and cost overruns encountered in SOH#1, it was decided to rotary drill SOH#2 to a depth of 582 m (1,909 ft). The hole was then core drilled to 623 m (2,044 ft) where rapidly deteriorating drilling conditions forced a return to rotary drilling. Core drilling was again attempted at 849 m (2,785 ft) and suspended at 863 m (2,830 ft). Coring was finally resumed at 1,253 m (4,108 ft) and continued uninterrupted to the end of the hole at 2,075 m (6,802 ft).

During rotary drilling cuttings were recovered from 119 m (390 ft) to 134 m (441 ft) and from 311 m (1,019 ft) to 515 m (1,689 ft). Cuttings from both these intervals contain unaltered basalts with hematite-stained vesicles, thermally altered basalts, and large amounts of orange cinder. These features indicate that the cuttings originated as subaerial lava flows and airborne near-vent deposits.

When core drilling commenced at 582 m (1,909 ft), the first unit encountered was a submarine pillow basalt. The change from subaerial deposits at 515 m (1,689 ft) to submarine pillow lavas at 582 m (1,909 ft) places the subaerial / submarine interface somewhere in this ~60 m (200 ft) interval. Pillow lavas and hyaloclastites alternate from 582 m (1,909 ft) to a depth of 607 m (1,990 ft). Below 607 m (1,990 ft), pillow lavas with 10% plagioclase phenocrysts, some altered black in color, continue to a depth of 623 m (2,044 ft), where their extremely fractured, unconsolidated condition forced a return to rotary drilling. No dikes were recorded in this section of core.

When core drilling resumed at 849 m (2,785 ft), pillow lavas encountered were nonvesicular with 5-7% olivine phenocrysts and 2% plagioclase phenocrysts altered black in color. The basaltic groundmass is patchily altered to smectite clay. This lithology continues until core drilling was again suspended at 863 m (2,830 ft). No dikes were recorded in this section of core.

Rotary cuttings were again obtained from 1,132 m (3,711 ft) to 1,252 m (4,104 ft). These are very fine-grained, gray-green clays with the exception of an interval between 1,225 m (4,018 ft) and 1,234 m (4,045 ft) where unaltered basalt predominates. This change in lithology probably represents the intrusion of a dike into hydrothermally altered hyaloclastites.

At 1,255 m (4,114 ft) core drilling was resumed. The units encountered are vesicular pillow lavas altered to smectite to a depth of 1,267 m (4,155 ft). Below this, an extremely thick hyaloclastite deposit altered to smectite reaches a depth of 1,333 m (4,370 ft). Beyond this depth

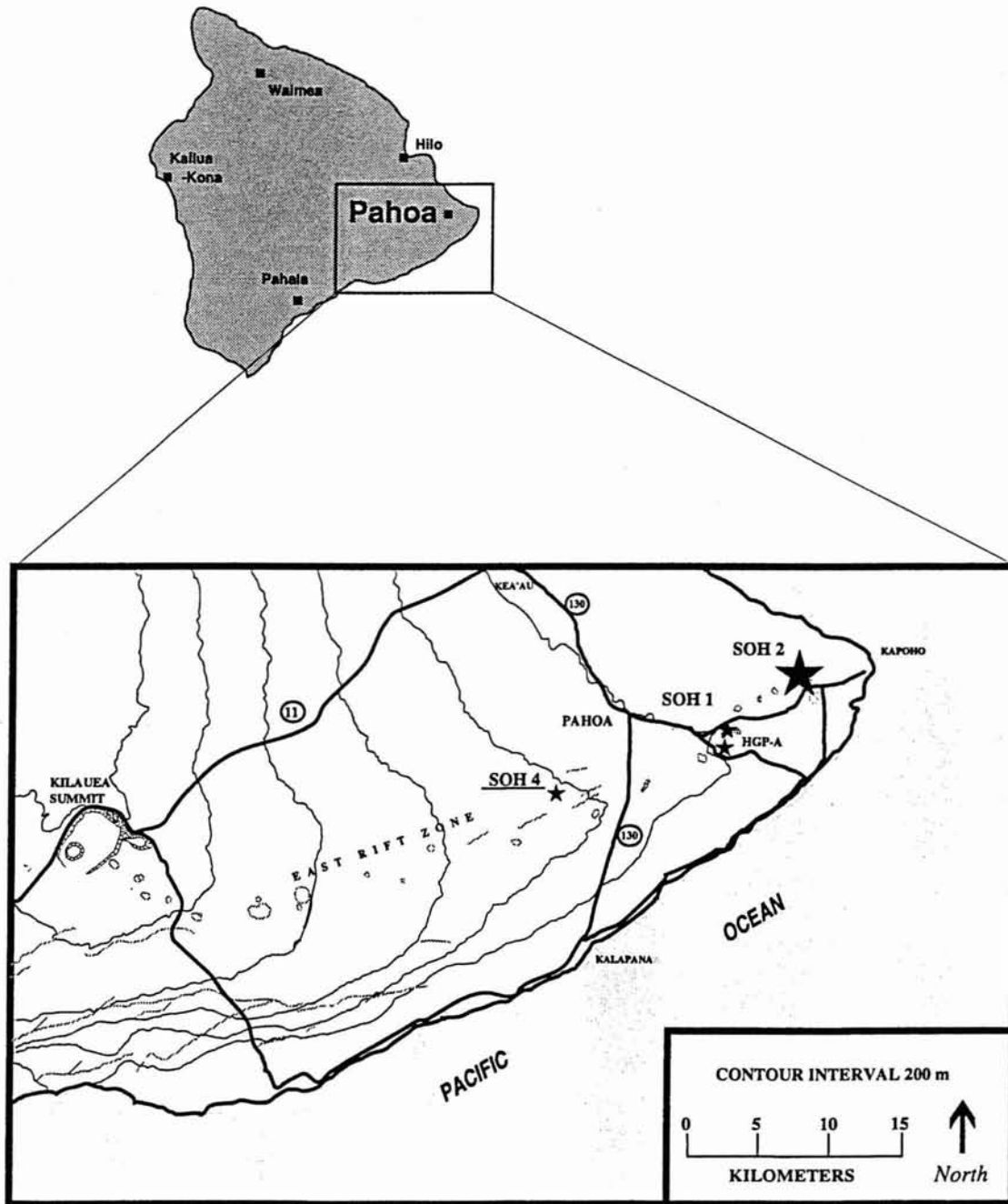


Figure 1: Site location map for Scientific Observation Holes.

hyaloclastites do not occur as massive units but fill the interstices between individual pillows and form thin units at the borders of pillow lava formations.

The pillow lavas themselves form at least seven distinct units 60 m (200 ft) to 90 m (300 ft) thick. These units are distinguishable from each other by differences in olivine and plagioclase phenocryst percentages and differences in the volume of vesiculation. The pillows within these units range in diameter from a few centimeters to 10 m (30 ft), with an average diameter of 0.5 m (1.6 ft).

All of these pillow units are sparsely phyric with 1-5% olivine and/or plagioclase phenocrysts. Exceptions are a small pillow lava unit encountered between 1,507 m (4,941 ft) and 1,530 m (5,081 ft), which has 15% plagioclase phenocrysts, and a large picritic pillow lava unit encountered at 1,935 m (6,343 ft) which continues to the bottom of the hole. This unit contains up to 30% olivine phenocrysts, fairly unaltered, in a groundmass completely altered to smectite. Hydrothermal alteration of the basaltic pillow groundmass to smectite is most intense as an aureole around large dikes, but is present where no dikes were recorded in the core.

Vesiculation in the pillow lavas varies between 30% by volume and 1 mm in diameter in a unit at 1,611 m (5,282 ft) to 1,648 m (5,405 ft) depth, to completely nonvesicular. One unit encountered from 1,763 m (5,780 ft) to 1,843 m (6,043 ft) depth contains vesiculation packages which are 15% by volume and 1 mm diameter in the top third of the pillows, nonvesicular in the middle third, and contain pipe vesicles 2-3 mm in diameter and 1-2 cm long in the bottom third.

Ninety-eight dikes were recorded in SOH#2 cores between 1,253 m (4,108 ft) and the bottom of the hole at 2,075 m (6,802 ft) (Figure 2). All are sparsely phyric except the largest, which extends from 1,433 m (4,700 ft) to 1,489 m (4,882 ft) with a dip of 55° from a horizontal drawn across the core, making it 32 m (104 ft) thick in cross section. This dike contains up to 30% plagioclase phenocrysts near its margins and grades to holocrystalline gabbro at its core. Large dikes in the submarine portion of SOH#2 cores are planar bodies, but small dikelets intrude along pillow lava margins and fill the interstices between pillows.

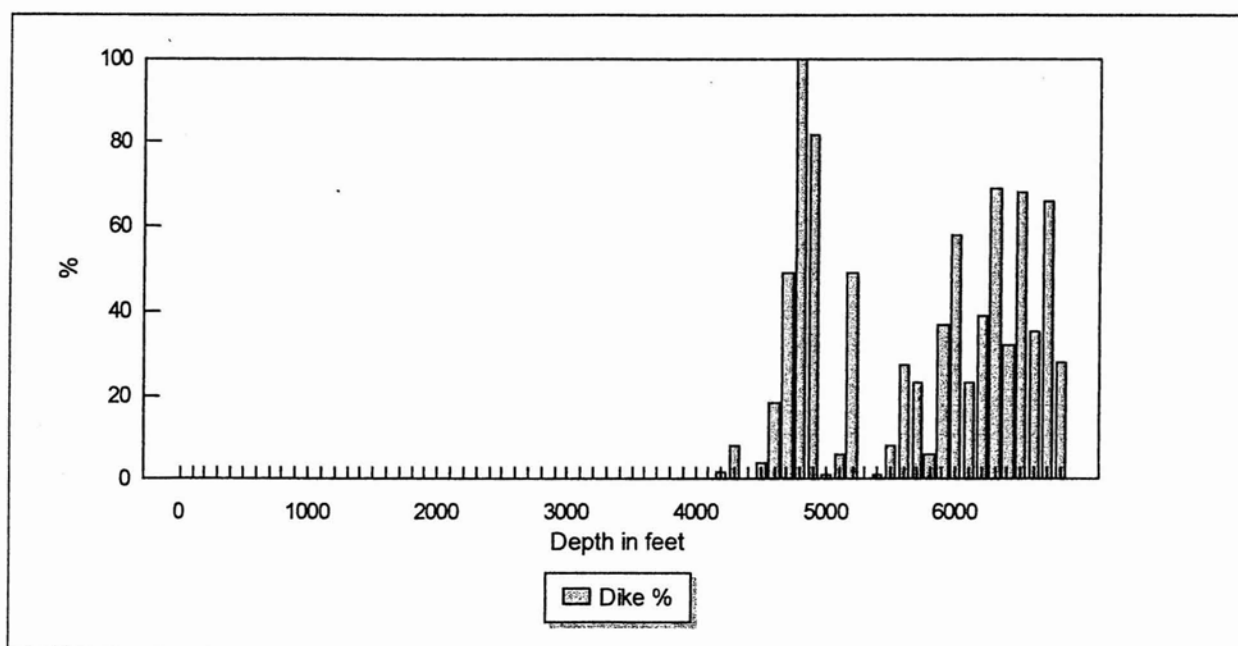


Figure 2. Percent of core composed of dike material averaged per 100 feet.

Secondary hydrothermal mineralization in SOH#2 is predominantly fracture fill with some accumulation in vesicles and vugs. Hematite first appears at 359 m (1,177 ft) as a vesicle stain and is continuous to 512 m (1,679 ft). Calcite appears at 383 m (1,255 ft) and is common to the bottom of the hole. Gypsum appears at 386 m (1,265 ft) and anhydrite at 1,255 m (4,018 ft); both are common to 1,954 m (6,408 ft). From 1,347 m (4,416 ft) to 1,400 m (4,591 ft), massive gypsum and/or anhydrite occasionally forms the matrix for pillow breccias. A blue clay stain, ubiquitous in shallower portions of the other SOH holes, is found from 500 m (1,639 ft) to 623 m (2,042 ft). Pyrite first appears at 591 m (1,937 ft) but is not common until 1,210 m (3,968 ft) and is ubiquitous from this depth to the bottom of the hole. Smectite starts at 623 m (2,042 ft) and coats nearly every fracture below this depth. From 1,201 m (3,938 ft) to 1,249 m (4,094 ft), orange iron oxide agglomerations, which appear to be altered olivine phenocrysts, are common in drill cuttings. White fibrous zeolites become common below 1,263 m (4,142 ft), and analcime first occurs at 1,295 m (4,247 ft). Euhedral quartz crystals appear at 1,243 m (4,075 ft) and are common to the bottom of the hole. Epidote makes rare appearances below 1,820 m (5,969 ft) and pyrrhotite below 1,975 m (6,475 ft).

Rock Quality Designation (RQD), which is a percentage measure of rock competency determined by the total length of core segments over 10 cm long in the box divided by the total length of core in the box, is uniformly high in the cored portion of the hole from 1,253 m (4,108 ft) to 2,075 m (6,802 ft). It falls below 50% in only five intervals; from 1,250 m (4,100 ft) to 1,281 m (4,200 ft), from 1,464 m (4,800 ft) to 1,525 m (5,000 ft), from 1,616 m (5,300 ft) to 1,677 m (5,500 ft), from 1,952 m (6,400 ft) to 1,982 m (6,500 ft), and from 2,013 m to (6,600 ft) to 2,075 m (6,800 ft) (Figure 3).

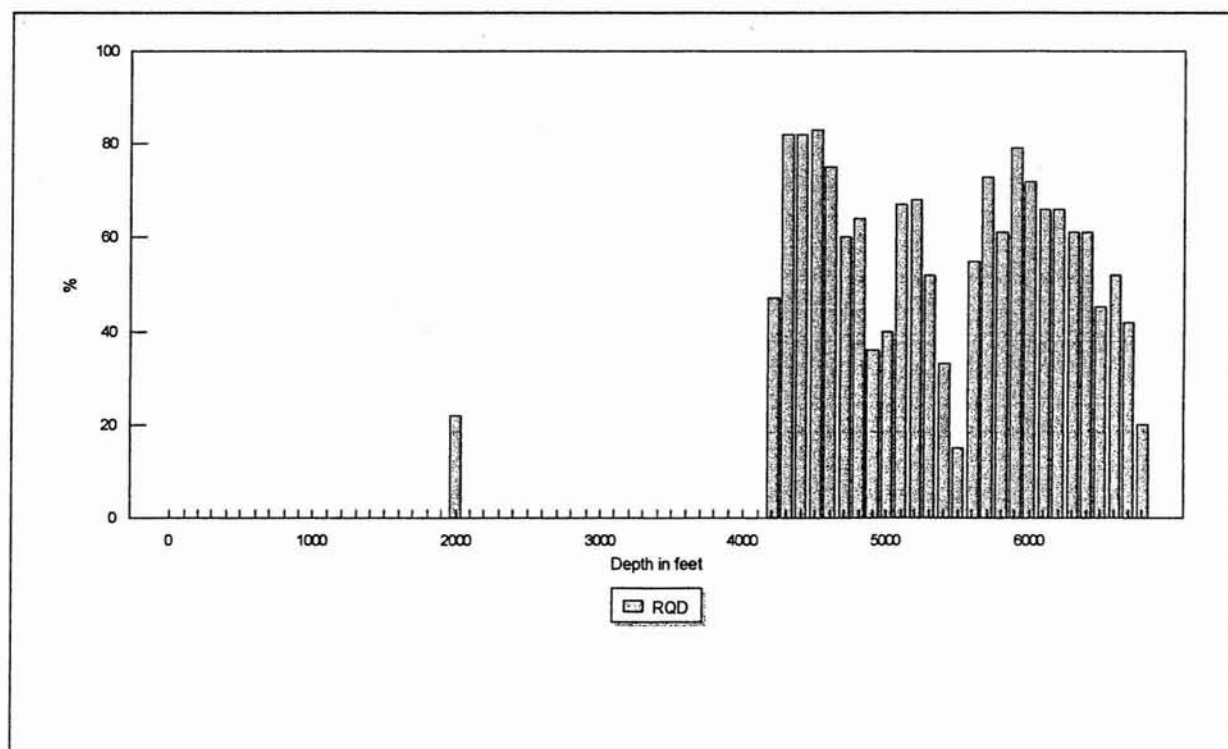


Figure 3. RQD averaged per 100 feet.

A temperature survey was made on the SOH#2 hole on June 6, 1991, eight days after the completion of drilling. The depth interval from 61 m to 1,815 m (200 to 5,950 ft) was logged by USGS wire line, and the interval from 1,830 m to 2,068 m (6,000 to 6,781 ft) by Pruett wire line. This survey is presented in graphic format in Figure 4.

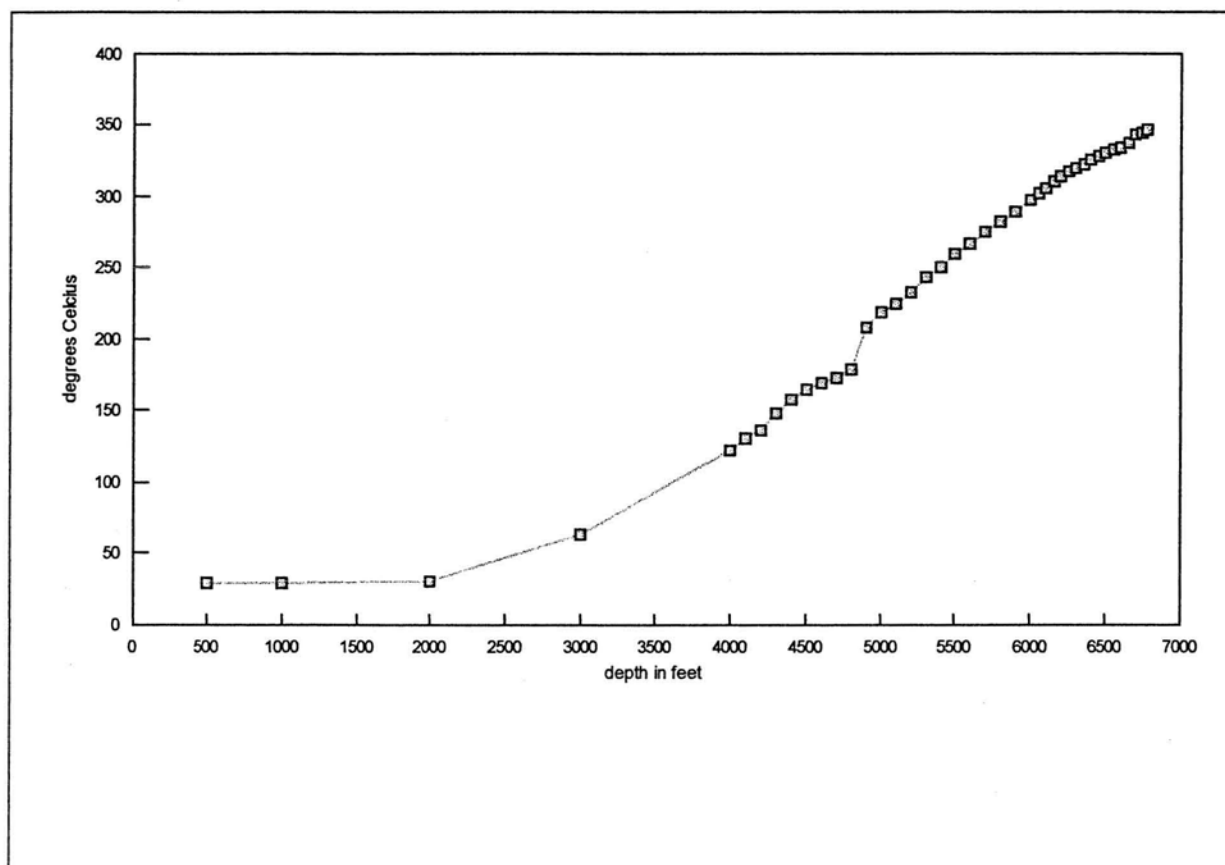


Figure 4. SOH#2 temperature survey June 6, 1991.

## CHIP AND CORE CATALOG KEY

This document presents data from the original chip log and core log sheets, and temperature surveys in the hole in graphic format. Its purpose is to serve as a catalog and reference to the drill chips and core.

Chip recovery in the rotary drilled upper section of the hole averaged only 28%. However, core recovery in the continuously cored section of the hole below 4,108 feet averaged 99.18%.

Figure 5 is a sample chip log. The first two columns on the left are depth in feet and the number of the bag containing chips from this depth interval. The third column presents data from the temperature survey run on June 6, 1991. The next column notes the presence of matrix and secondary hydrothermal alteration minerals in the chip bag by a diagonally hatched bar. The fifth column presents the percentages of chips of various lithologies in the bag. The sixth column is a symbolic representation of the morphology of the dominant unit in the bag interpreted from the lithologies of the chips. The last column is a short description of this unit. For example, a bag which contained 85% aphanitic basalt chips with 2-3% olivine phenocrysts and 15% red cinder would be represented symbolically by the subaerial flow symbol and would be described in the last column as an aphanitic, sparsely phyrlic subaerial flow.

Figure 6 is a sample core log. The first two columns on the left are depth in feet and the number of the box containing core from this depth interval. The third column presents data from the same temperature survey discussed above. The next column notes the presence of matrix and secondary hydrothermal alteration minerals in the core box by a diagonally hatched bar. The fifth column, RQD, notes the percentage of core segments over 10 cm long in the core box. The sixth column is a symbolic representation of the morphology of the dominant unit in the box. The last column, which has been condensed from the text of the original core logs, is a description of the morphology and lithology of all the units present in the box. It starts with the numbers of the units as they occur in downward sequence through the box, then gives the morphological name of the unit or units, the percentage of vesicles present by volume and their diameter, the type of phenocrysts present and their percentages by volume, a textural description of the units, their thickness in centimeters and, if the unit is a dike, its contact angle with the previous unit in degrees from horizontal. Hydrothermal alteration minerals listed in upper case letters are keyed to the graphic format of the fourth column, those in lower case letters do not appear in the fourth column. Minerals preceded by "XRD:" are identified by x-ray diffraction at the University of Hawaii at Manoa.

## ACKNOWLEDGMENTS

The data presented here were obtained while we worked on the Scientific Observation Hole project. We would like to thank Dr. Harry Olson and Dr. Don Thomas for giving us the opportunity to work on this exciting project. And, we would like to thank Dr. Martha Sykes and Dr. Terry Keith for providing XRD identification of and information on hydrothermal alteration minerals in the chips and core.



SOH 2

# Scientific Observation Hole Site 2 Elevation 280 ft a.s.l.

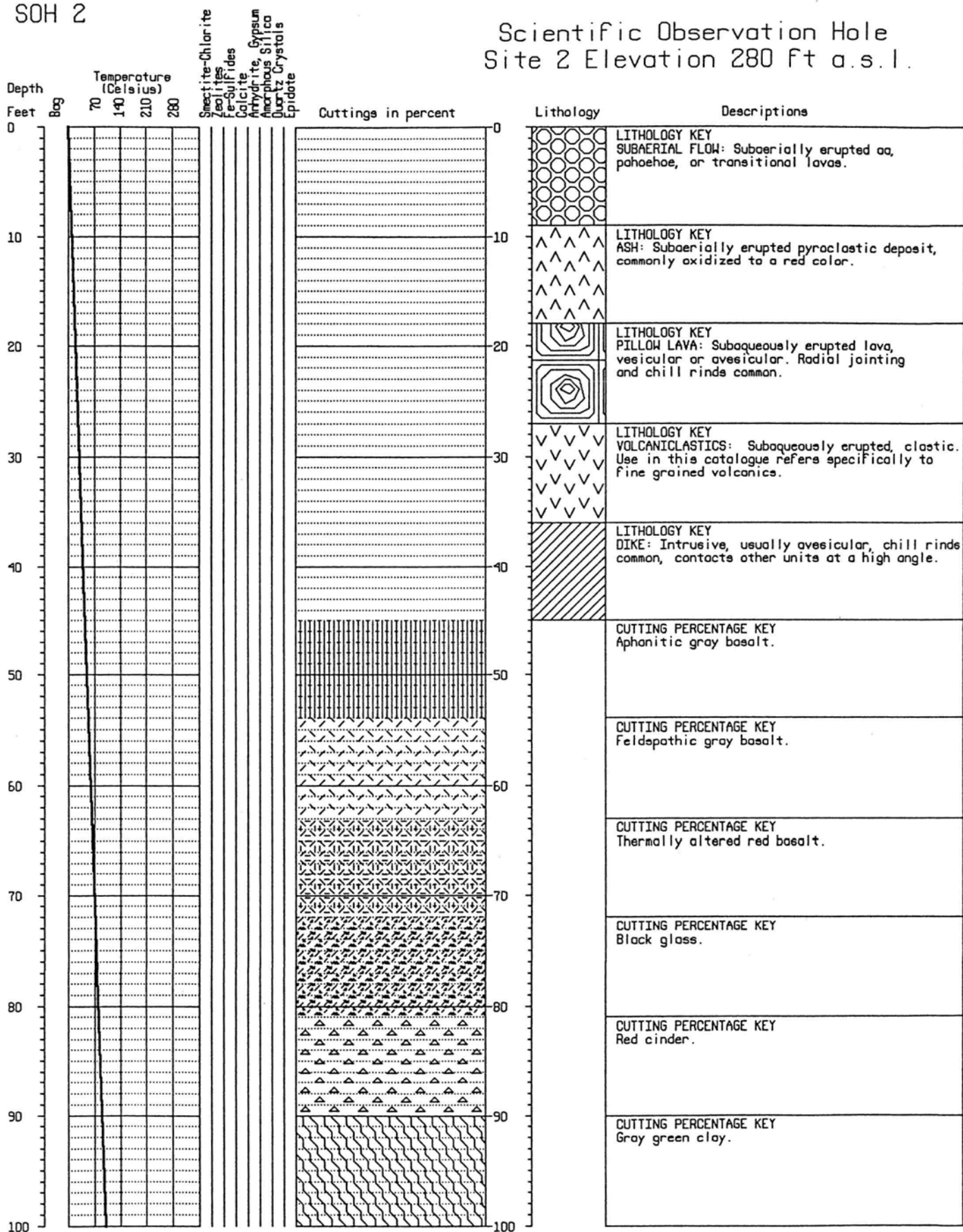


Figure 5. Sample chip log.

SOH 2

# Scientific Observation Hole Site 2 Elevation 280 ft a.s.l.

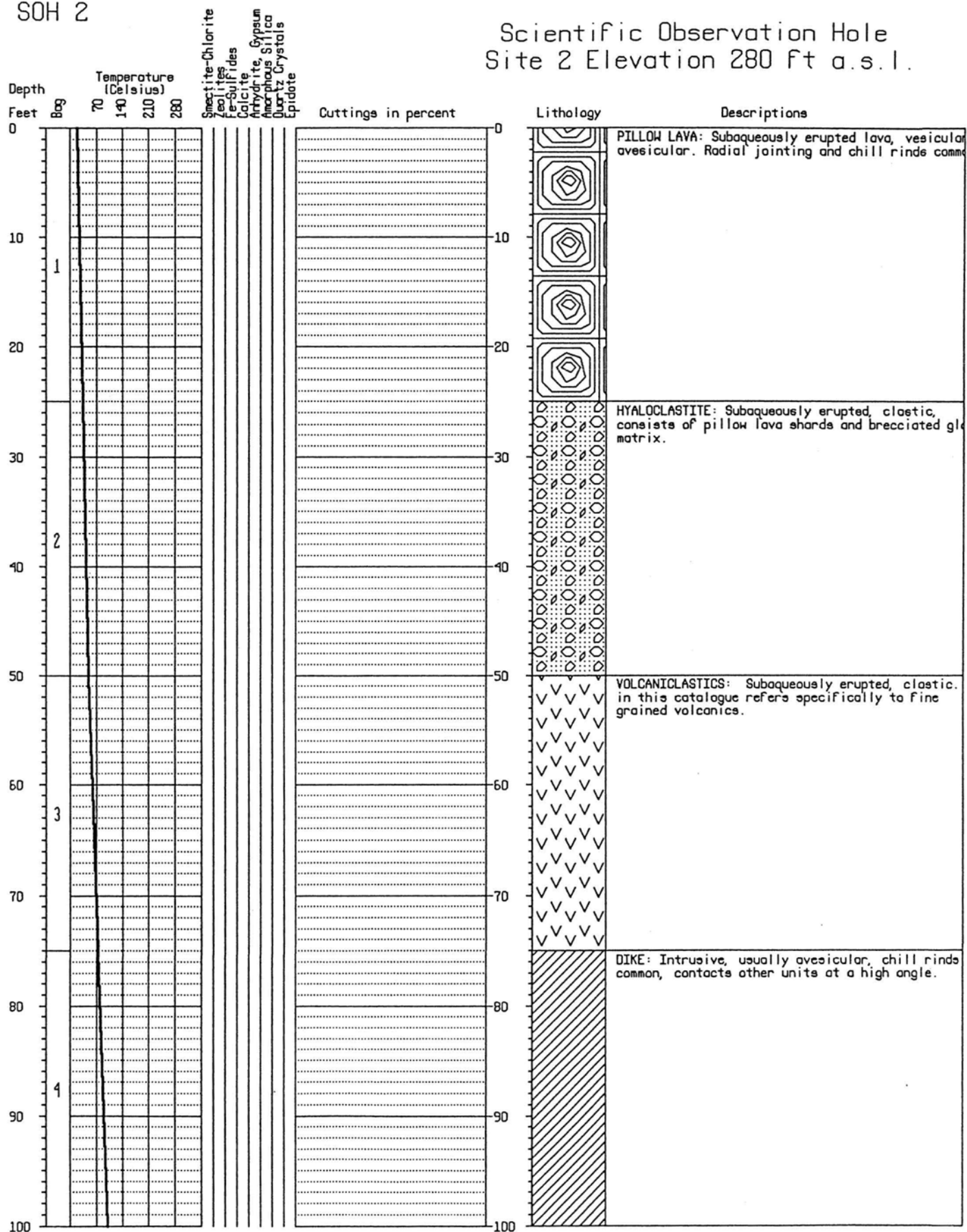


Figure 6. Sample core log.



# Scientific Observation Hole Log

Site 2

SOH 2

Scientific Observation Hole  
Site 2 Elevation 280 ft a.s.l.

Scientific Observation Hole  
Site 2 Elevation 280 ft a.s.l.

Depth Feet	Bag	Temperature (Celsius)				Spectrite-Chlorite Zeolites Fe-Sulfides Calcite Anhydrite, Gypsum Amorphous Silica Quartz Crystals Epoxide	Cuttings in percent	Lithology	Descriptions
		70	140	210	280				
300									
310									
320									
330									
340									
350									
360									LOST CIRCULATION ZONE.
370									
380									
390	1								1) SUBAERIAL FLOW, <1% olivine phenocrysts and microphenocrysts, <<1% plagioclase phenocrysts, in a light gray brown feldspathic matrix. 2) Dike, black aphanitic matrix with glass.
400									

[illegible]

### Lithology

### Descriptions

[illegible]

SOH 2

# Scientific Observation Hole Site 2 Elevation 280 ft a.s.l.

Depth Feet	Bag	Temperature (Celsius)				Cuttings in percent	Lithology	Descriptions
		70	140	210	280			
1000								LOST CIRCULATION ZONE.
1010								
1020	7							1) SUBAERIAL FLOW, <1% olivine phenocrysts and microphenocrysts, <<1% plagioclase phenocrysts and laths in a light gray brown feldspathic matrix. 2) Dike, black aphanitic matrix with glass. 10% drilling cement in chips.
1030	8							1) DIKE, 1-2% olivine phenocrysts unaltered, <1% altered red. 30% drilling cement in chips.
1040	9							1) DIKE, 1% olivine phenocrysts unaltered, <1% plagioclase phenocrysts. 10% drilling cement in chips.
1050	10							1) DIKE, 1% olivine phenocrysts and <<1% plagioclase rhombs and laths in a medium dark gray feldspathic matrix. 2) Ash, subaerial red-orange cinder. 5% drilling cement in chips.
1060	11							1) ASH, thickly bedded red cinder.
1070	12							1) ASH, thickly bedded red cinder.
1080	13							1) ASH, subaerial red-orange / red-brown oxidized cinder with black glass. 2) Subaerial Flow, <1% olivine phenocrysts and <<1% plagioclase rhombs and laths in a dark gray feldspathic matrix.
1090								
1100	14							1) SUBAERIAL FLOW, see next page.

Smeectite-Chlorite  
 Zeolites  
 Fe-Sulfides  
 Calcite  
 Anhydrite, Gypsum  
 Amorphous Silica  
 Quartz Crystals  
 Epidote

# CATALOG OF SOH 2 CUTTINGS

CATALOG OF SUB 2 CUTTINGS																								
Depth	BAG	Temp (C)				Cutoffs												Cuttings in percent	Lithology	Descriptions				
Feet		70	140	210	280	Gr-CI	Zeol.	Le-S	Cal	Am/gy	Am/Si	X/Otz	Epi.											
1100																								
	14																							
1110																								
1120																								
1130																								
1140																								
1150																								
1160																								
	15																							
1170																								
1180																								
	16																							
1190																								
1200	17																							



# CATALOG OF SOH 2 CUTTINGS

Depth Feet	BAG	Temp (C) 70 140 210 280	Sn-Cl Zeol.	Fe-S Cal.	Am/Gy An/Si	X/Qtz Ep.	Cuttings in percent	Lithology	Descriptions
1200									1) SUBAERIAL FLOW, 1% olivine phenocrysts and 1% plagioclase phenocrysts in a light gray aphanitic matrix. Secondary Mineralogy: Hematite.
1210	17								
1220	18								1) SUBAERIAL FLOW, 1-2% olivine phenocrysts and <<1% plagioclase phenocrysts in a dark gray aphanitic matrix. Secondary Mineralogy: Hematite.
1230	19								1) SUBAERIAL FLOW, 1% olivine phenocrysts and 1% plagioclase phenocrysts in a light gray aphanitic matrix. Secondary Mineralogy: Hematite.
1240	20								1) SUBAERIAL FLOW, 1% olivine phenocrysts and 1% plagioclase phenocrysts in a light gray aphanitic matrix. Secondary Mineralogy: Hematite.
1250	21								1) SUBAERIAL FLOW, very sparsely phyric, <<1% olivine and plagioclase phenocrysts, some thermally altered brick red, in a light gray aphanitic matrix.
1260	22								1) SUBAERIAL FLOW, very sparsely phyric, <<1% olivine and plagioclase phenocrysts, some thermally altered brick red, in a light gray aphanitic matrix. Secondary Mineralogy: Hematite.
1270	23								1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine and plagioclase phenocrysts in a light gray aphanitic matrix. Secondary Mineralogy: hematite, GYPSUM-ANHYDRITE.
1280	24								1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine and plagioclase phenocrysts in a gray aphanitic matrix. Secondary Mineralogy: hematite, GYPSUM-ANHYDRITE, CALCITE.
1290	25								1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine and plagioclase phenocrysts in a gray aphanitic matrix. 2) Subaerial Flow, phenocrysts as in unit 1, feldspathic texture. Secondary Mineralogy: hematite, GYPSUM-ANHYDRITE, CALCITE.
1300	26								1) SUBAERIAL FLOW, 1% olivine phenocrysts and 1% plagioclase phenocrysts in a gray feldspathic matrix. 2) Ash, thin beds of red cinder. Secondary Mineralogy: hematite.

## CATALOG OF SOH 2 CUTTINGS

Depth Feet	BAG	Temp (C) 70 140 210 280	Sm-Cl Zeol.	Fe-S Col.	Am-Gy An-St X/Qtz	Epi.	Cuttings in percent	Lithology	Descriptions
1300	26								1) SUBAERIAL FLOW, 1% olivine phenocrysts and 1% plagioclase phenocrysts in a gray feldspathic matrix. 2) Ash, thin beds of red cinder. Secondary Mineralogy: hematite.
1310	27								1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine and plagioclase phenocrysts in a gray aphanitic matrix. 2) Subaerial Flow, phenocrysts as in unit 1, thermally altered brick red. 3) Ash, red cinder beds. Secondary Mineralogy: hematite.
1320	28								1) SUBAERIAL FLOW, very sparsely phyric, <<1% olivine and plagioclase phenocrysts in a gray aphanitic matrix.
1330	29								1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine phenocrysts and <<1% plagioclase phenocrysts in a dark gray aphanitic matrix. Secondary Mineralogy: hematite, CALCITE.
1340	30								1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine phenocrysts and <<1% plagioclase phenocrysts in a gray aphanitic matrix. Secondary Mineralogy: hematite, CALCITE.
1350	31								1) SUBAERIAL FLOW, very sparsely phyric, <<1% olivine phenocrysts in a gray aphanitic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in a feldspathic matrix. 3) Subaerial Flow, thermally altered brick red. Secondary Mineralogy: CALCITE.
1360	32								1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine phenocrysts, altered and unaltered, and <<1% plagioclase phenocrysts in a gray feldspathic matrix. Secondary Mineralogy: GYPSUM-ANHYDRITE, CALCITE.
1370	33								1) SUBAERIAL FLOW, 3% olivine phenocrysts, altered and unaltered, <<1% plagioclase phenocrysts in a gray feldspathic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in an aphanitic matrix.
1380	34								1) SUBAERIAL FLOW, 3% olivine phenocrysts, altered and unaltered, in a gray feldspathic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in an aphanitic matrix. Secondary Mineralogy: GYPSUM/ANHYDRITE.
1390	35								1) SUBAERIAL FLOW, 3% olivine phenocrysts, altered and unaltered, in a gray feldspathic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in an aphanitic matrix. 3) Ash, red cinder beds.
1400	36								1) SUBAERIAL FLOW, 1% olivine phenocrysts unaltered, in a gray feldspathic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in an aphanitic matrix. Secondary Mineralogy: CALCITE.

## CATALOG OF SOH 2 CUTTINGS

Depth Feet	BAG	Temp (C) 70 140 210 280	Sn-Cu Feo	Le-S Feo	Cal Feo	Am/Sy X/Otz	Epi	Cuttings in percent	Lithology	Descriptions
1400	36									1) SUBAERIAL FLOW, 1% olivine phenocrysts unaltered, in a gray feldspathic matrix. 2) Subaerial Flow, as in unit 1 in an aphanitic matrix. Secondary Mineralogy: CALCITE.
1410	37									1) SUBAERIAL FLOW, very sparsely phyric, <1% olivine phenocrysts, unaltered, and <<1% plagioclase phenocrysts in a gray aphanitic matrix. 2) Ash, red cinder beds. Secondary Mineralogy: CALCITE, GYPSUM/ANHYDRITE.
1420	38									1) ASH, thick bedded red cinder. Secondary Mineralogy: Hematite.
1430	39									1) SUBAERIAL FLOW, 1% olivine phenocrysts, altered and unaltered, <<1% plagioclase phenocrysts in a gray aphanitic matrix. Secondary Mineralogy: Hematite.
1440	40									1) SUBAERIAL FLOW, borderline picritic, 7% olivine phenocrysts, altered and unaltered, 5% plagioclase phenocrysts in a gray aphanitic matrix. 2) Subaerial Flow, thermally altered red with phenocrysts as in unit 1. Secondary Mineralogy: CALCITE.
1450	41									1) SUBAERIAL FLOW, borderline picritic, 7% olivine phenocrysts, altered and unaltered, 5% plagioclase phenocrysts in a gray aphanitic matrix. 2) Subaerial Flow, thermally altered red with phenocrysts as in unit 1.
1460	42									1) SUBAERIAL FLOW, 5% olivine phenocrysts, altered and unaltered, 5% plagioclase phenocrysts in a gray feldspathic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in an aphanitic matrix. Secondary Mineralogy: CALCITE.
1470	43									1) SUBAERIAL FLOW, 3% olivine phenocrysts, altered and unaltered, 2% plagioclase laths and microphenocrysts in a dark gray aphanitic matrix. 2) Ash, red cinder beds.
1480	44									1) SUBAERIAL FLOW, 3% olivine phenocrysts, altered and unaltered, 1% plagioclase laths and microphenocrysts in a dark gray aphanitic matrix. 2) Ash, red cinder beds.
1490	45									1) SUBAERIAL FLOW, 1-2% olivine phenocrysts, altered and unaltered, 1% plagioclase laths and microphenocrysts in a dark gray aphanitic matrix. 2) Ash, red cinder beds.
1500	46									1) SUBAERIAL FLOW, 1% olivine phenocrysts, altered and unaltered, <1% plagioclase laths and microphenocrysts in a dark gray aphanitic matrix. 2) Ash, red cinder beds.



Depth		Temp (C)	
Feet	BAG		
		70	Sn-Cl
		140	Zeol.
		210	Fe-S
		280	Cal
			An/Gy
			An/Si
			X/Otz
			Epi.

1500	46					1500	1) SUBAERIAL FLOW, 1% olivine phenocrysts, altered and unaltered, <1% plagioclase laths and microphenocrysts in a dark gray aphanitic matrix. 2) Ash, red cinder beds.
1510	47					1510	1) SUBAERIAL FLOW, sparsely phyrlic, 1% olivine phenocrysts, altered and unaltered, in a gray aphanitic matrix. Secondary Mineralogy: CALCITE.
1520	48					1520	1) SUBAERIAL FLOW, sparsely phyrlic, 1% olivine phenocrysts, altered and unaltered, 1% plagioclase phenocrysts in a gray aphanitic matrix. Secondary Mineralogy: Hematite.
1530	49					1530	1) SUBAERIAL FLOW, sparsely phyrlic, 1% olivine phenocrysts, altered and unaltered, 1% plagioclase phenocrysts in a gray aphanitic matrix. Secondary Mineralogy: Hematite.
1540	50					1540	1) SUBAERIAL FLOW, very sparsely phyrlic, <<1% olivine phenocrysts, altered and unaltered, <<1% plagioclase phenocrysts in a gray aphanitic matrix or aphanitic, aphyric dike. Secondary Mineralogy: CALCITE.
1550	51					1550	1) SUBAERIAL FLOW, very sparsely phyrlic, <<1% olivine phenocrysts, altered and unaltered, in a gray aphanitic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in a feldspathic matrix or aphyric dike.
1560	52					1560	1) SUBAERIAL FLOW, sparsely phyrlic, <1% olivine phenocrysts, altered and unaltered, <1% plagioclase phenocrysts in a gray aphanitic matrix. Secondary Mineralogy: Hematite, sulfur.
1570	53					1570	SUBAERIAL FLOW, sparsely phyrlic, <1% olivine phenocrysts, altered and unaltered, <1% plagioclase phenocrysts in a gray aphanitic matrix. Secondary Mineralogy: Hematite, CALCITE.
1580	54					1580	1) SUBAERIAL FLOW, sparsely phyrlic, 1% olivine phenocrysts, altered and unaltered, 1% plagioclase phenocrysts in a gray aphanitic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in a feldspathic matrix. Secondary Mineralogy: Hematite.
1590	55					1590	1) SUBAERIAL FLOW, sparsely phyrlic, 1% olivine phenocrysts, altered and unaltered, 1% plagioclase phenocrysts in a gray aphanitic matrix. 2) Subaerial Flow, phenocrysts as in unit 1 in a feldspathic matrix. 3) Subaerial Flow, thermally altered red, phenocrysts as in unit 1. Secondary Mineralogy: Hematite, CALCITE.
1600						1600	

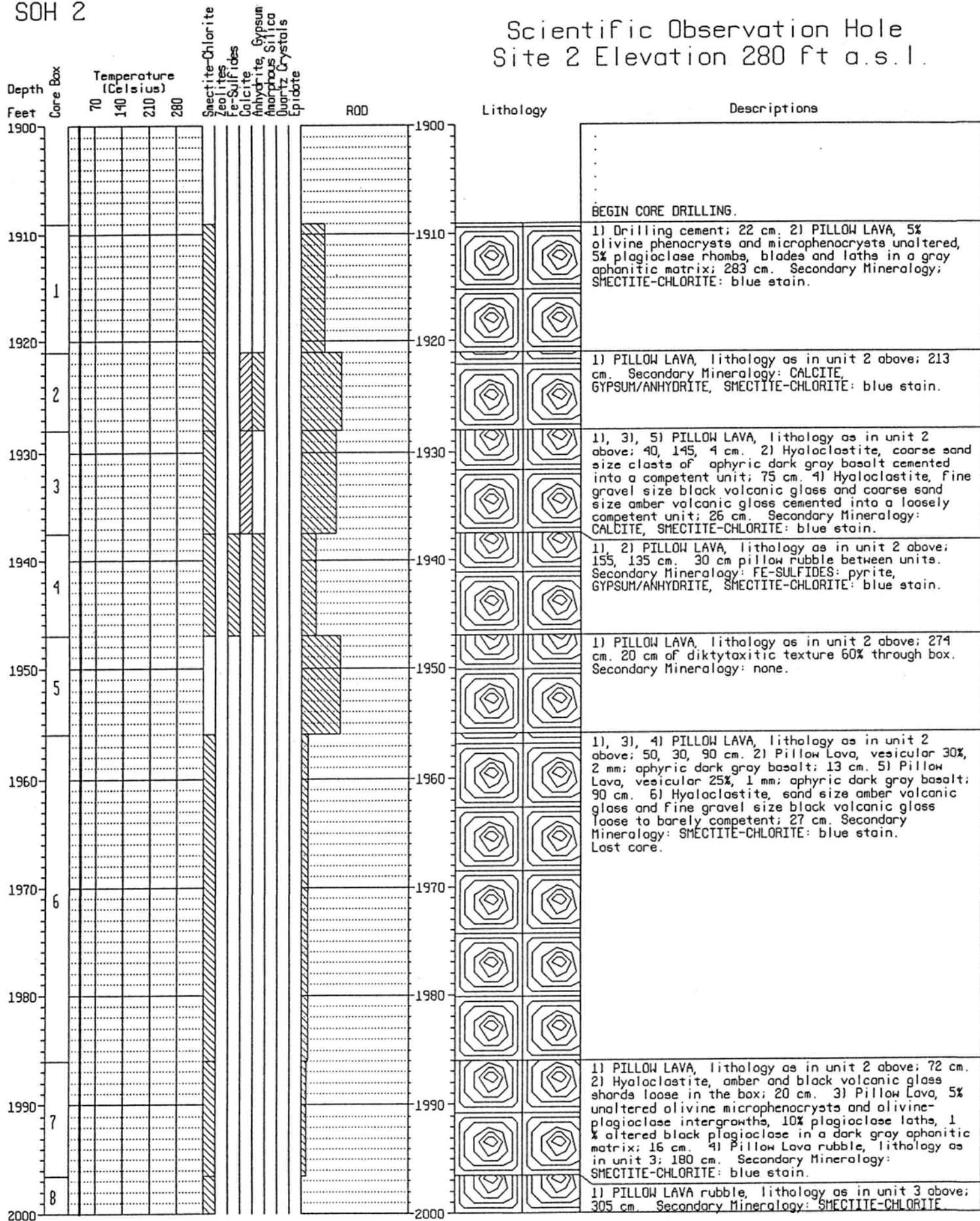
Scientific Observation Hole  
Site 2 Elevation 280 ft a.s.l.

Depth Feet	Bag	Temperature (Celsius)				Cuttings in percent	Lithology	Descriptions
		70	140	210	280			
1600								
56								1) SUBAERIAL FLOW, 1% olivine phenocrysts, altered and unaltered, in a gray feldspathic matrix, or dike, lithology as in unit 1.
1610								1) DIKE, ophyric, aphanitic gray basalt.
57								
1620								
58								1) SUBAERIAL FLOW, 1% olivine phenocrysts, most altered to iddingsite, in a gray feldspathic matrix. Secondary Mineralogy: Hematite.
1630								
59								1) SUBAERIAL FLOW, 2-3% olivine phenocrysts, most altered to iddingsite, in a gray feldspathic matrix. Probably nearing subaerial/submarine interface, blue veneer is typical of hyaloclastites. Secondary Mineralogy: Hematite, SMECTITE-CHLORITE: blue stain.
1640								
60								1) SUBAERIAL FLOW, <1% olivine phenocrysts, <<1% altering to iddingsite, <1% plagioclase rhombs and microphenocrysts in a medium to dark gray aphanitic to feldspathic matrix. Secondary Mineralogy: Hematite, SMECTITE-CHLORITE: blue stain.
1650								
61								1) SUBAERIAL FLOW, 2-3% olivine phenocrysts, <1% altering to iddingsite, 1% plagioclase rhombs and microphenocrysts, <<1% augite rhombs in a gray aphanitic matrix. Secondary Mineralogy: SMECTITE-CHLORITE: blue stain.
1660								
62								1) SUBAERIAL FLOW, 1% olivine phenocrysts, <1% altering to iddingsite, 1% plagioclase rhombs and microphenocrysts in a gray aphanitic matrix. Secondary Mineralogy: Hematite, QUARTZ CRYSTALS.
1670								
63								1) SUBAERIAL FLOW, 1% olivine phenocrysts, <<1% altering to iddingsite, 1% plagioclase rhombs and microphenocrysts in a lite-medium gray aphanitic matrix. Secondary Mineralogy: Hematite.
1680								
1690								LOST CIRCULATION AND SAMPLES UNTIL WE RESUMED DRILLING AT 1910 ft.
1700								

Smectite-Chlorite  
 Zeolites  
 Fe-Sulfides  
 Calcite  
 Anhydrite  
 Gypsum  
 Amorphous Silica  
 Quartz Crystals  
 Epidote

SOH 2

# Scientific Observation Hole Site 2 Elevation 280 ft a.s.l.



SOH 2

Scientific Observation Hole  
Site 2 Elevation 280 ft a.s.l.

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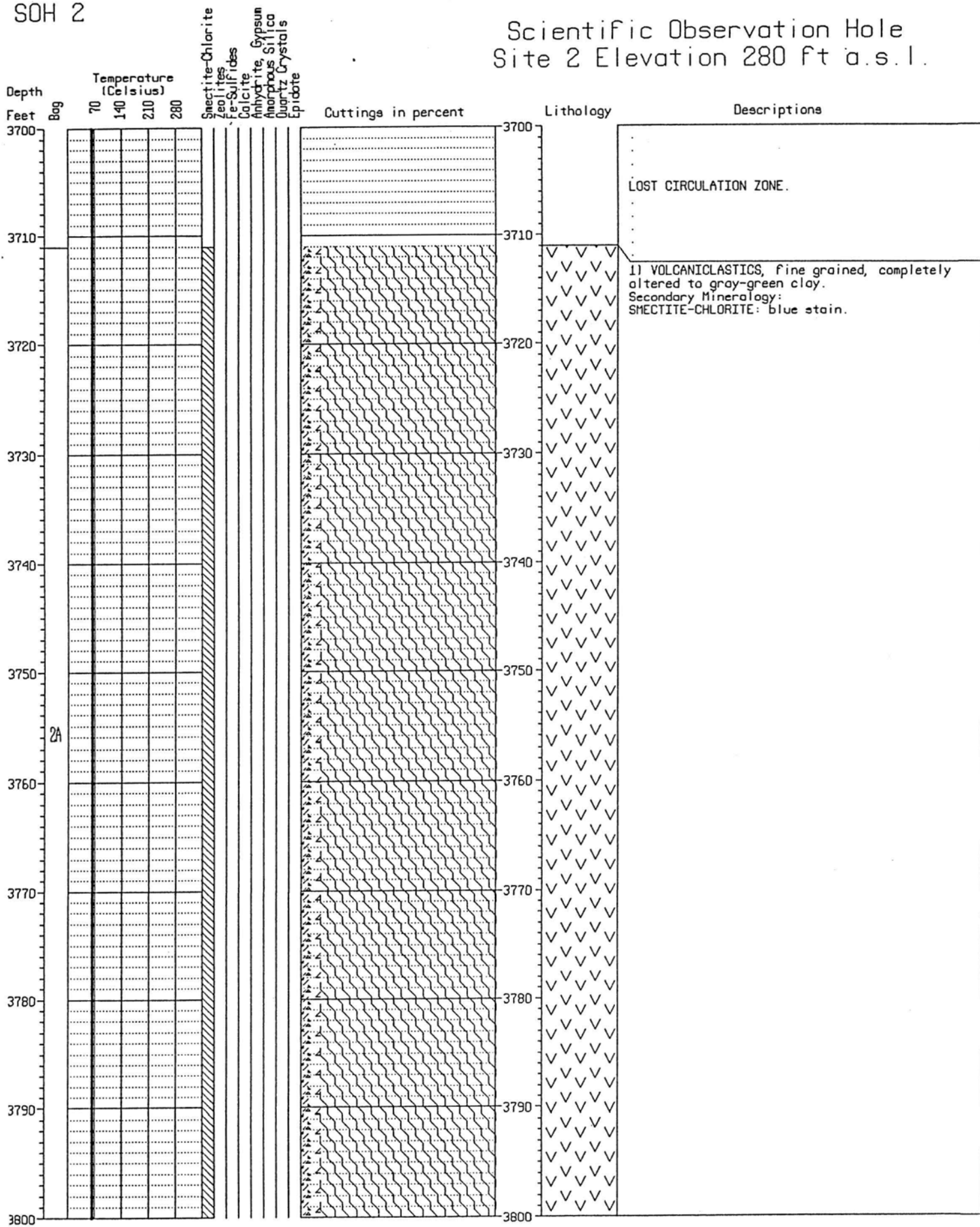


## CATALOG OF SOH 2 CORE

Depth Feet	BOX	Temp (C) 70 140 210 280	Sn-Cl Fe-S Cal Am/Gy An/Si X/Qtz Epi.	ROD	Lithology	Descriptions
2800	12					1) PILLOW LAVA, see previous page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
2810	13					1), 2) PILLOW LAVA, 5% olivine phenocrysts, microphenocrysts, and olivine-plagioclase intergrowths unaltered, 2% altered plagioclase occurring with olivine-plagioclase intergrowths, in a dark gray aphanitic-matrix patches of which have been pervasively altered to smectite; 137, 152 cm. Secondary Mineralogy: CALCITE, SMECTITE-CHLORITE: blue stain.
2820	14					1) PILLOW LAVA, lithology as in unit 1 above; 259 cm. Secondary Mineralogy: smectite, CALCITE, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE: blue stain.
2830	15					1) PILLOW LAVA, lithology as in unit 1 above; 29 cm. 2) Pillow Lava, 7% olivine phenocrysts and microphenocrysts unaltered in a dark gray aphanitic matrix; 230 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, GYPSUM/ANHYDRITE.
2840	16					1), 2) PILLOW LAVA, lithology as in unit 1 above. Dark glass rind at contact with unit 2; 35, 56 cm. Secondary Mineralogy: smectite, CALCITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
2850						CORE DRILLING SUSPENDED.
2860						
2870						
2880						
2890						
2900						

SOH 2

Scientific Observation Hole  
Site 2 Elevation 280 ft a.s.l.



## CATALOG OF SOH 2 CUTTINGS

Depth Feet	BAG	70	Temp (C) 140	210	280	Sm-Cl Zeol.	Fe-S Cal.	Am-Gy X/Otz	Epi.	Cuttings in percent	Lithology	Descriptions
3800	3A											1) VOLCANICLASTICS, fine grained, unaltered and completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE: blue stain.
3810	4A											1) VOLCANICLASTICS, fine grained, unaltered and completely altered to gray-green clay. 2) Pillow Lava, sparsely phytic, <1% olivine phenocrysts, unaltered, <1% plagioclase phenocrysts. Secondary Mineralogy: SMECTITE-CHLORITE: blue stain, CALCITE.
3820	5A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay, possible pillow lava. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3830	6A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay, possible pillow lava. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3840	7A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay, possible pillow lava. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3850	8A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3860	9A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3870	10A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3880	11A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3890	12A											1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3900	13A											1) VOLCANICLASTICS, see next page.

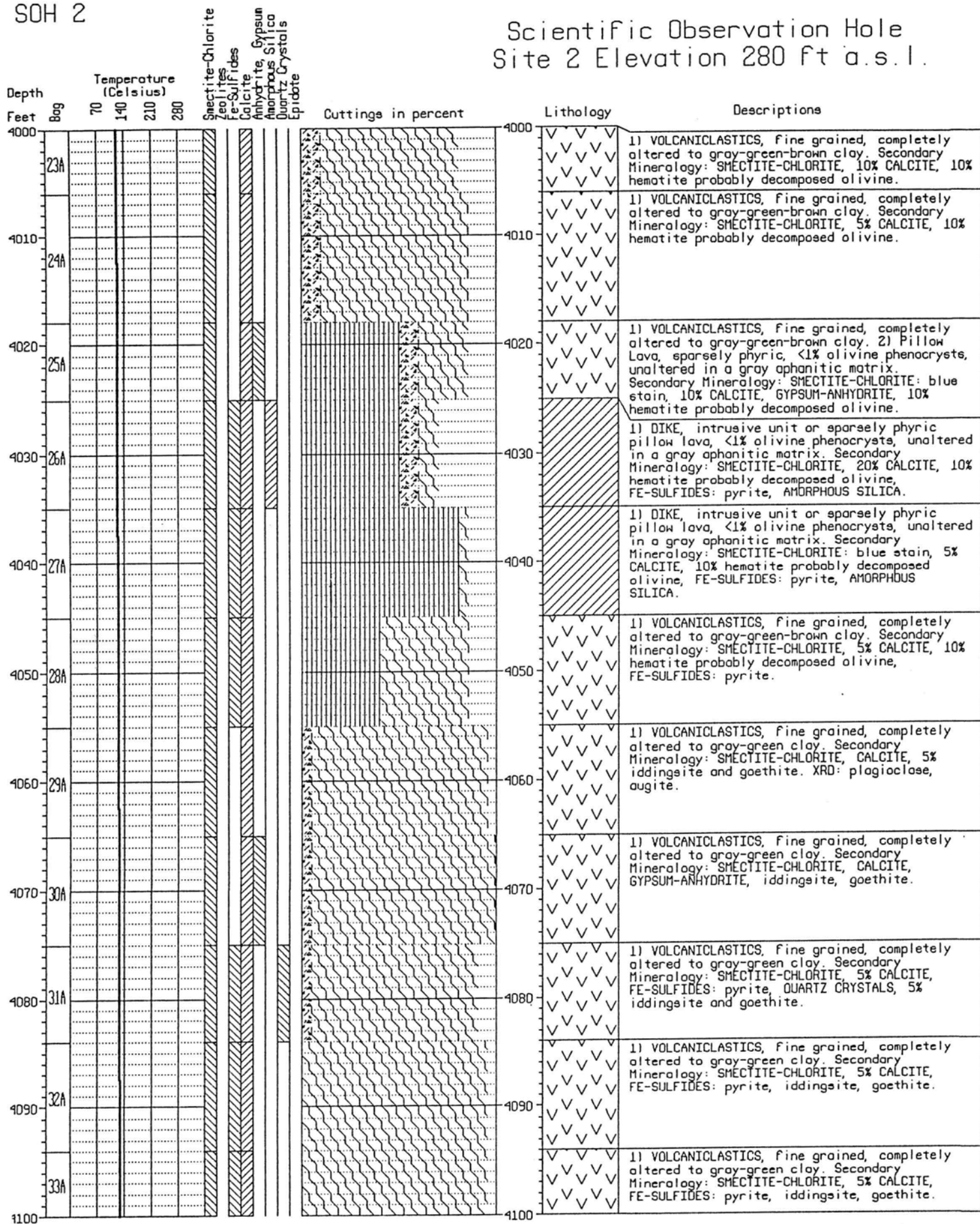
Depth	Temp (C)	
Feet		
BAG		
70		
140		
210		
280		
		Sn-Cl
		Zeol.
		Fe-S
		Cal.
		An/Gy
		An/Si
		X/Otz
		Epi.

3900	13A		3900	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3910	14A		3910	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3920	15A		3920	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3930	16A		3930	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE.
3940	17A		3940	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, iddingsite, CALCITE, AMORPHOUS SILICA.
3950	18A		3950	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, iddingsite, CALCITE.
3960	19A		3960	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, iddingsite, CALCITE.
3970	20A		3970	1) VOLCANICLASTICS, fine grained, completely altered to gray-green clay. Secondary Mineralogy: SMECTITE-CHLORITE, hematite, FE-SULFIDES: pyrite, 10% CALCITE.
3980	21A		3980	1) VOLCANICLASTICS, fine grained, completely altered to brownish gray clay. Secondary Mineralogy: SMECTITE-CHLORITE, 10% CALCITE, 10% hematite may be decomposed olivine or pyrite.
3990	22A		3990	1) VOLCANICLASTICS, fine grained, completely altered to gray-green-brown clay. Secondary Mineralogy: SMECTITE-CHLORITE, 10% CALCITE, 10% hematite may be decomposed olivine or pyrite.
4000	23A		4000	1) VOLCANICLASTICS, see next page.



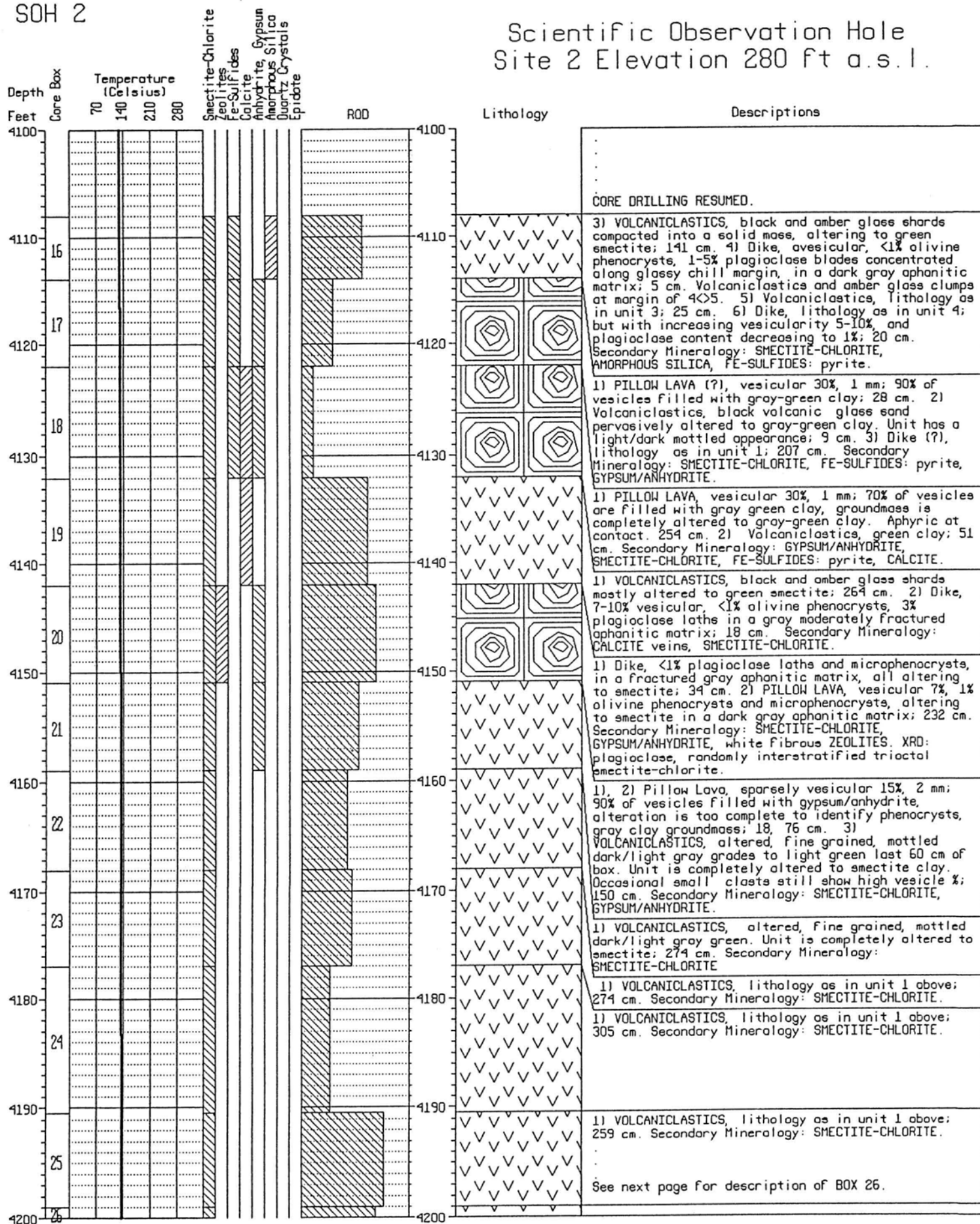
SOH 2

# Scientific Observation Hole Site 2 Elevation 280 ft a.s.l.



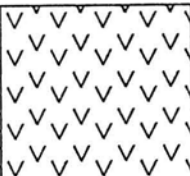

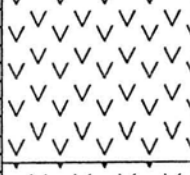

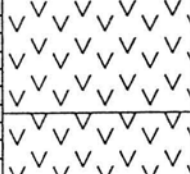
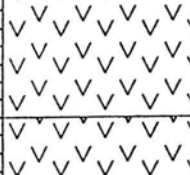
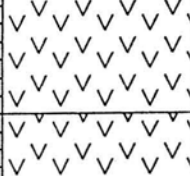


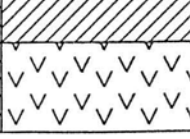
SOH 2

# Scientific Observation Hole Site 2 Elevation 280 ft a.s.l.



Depth Feet	BOX	Temp (C)				Sn-Cl Zeol.	Fe-S Zeol.	Ca/Si Col.	Mn/Si X/Qtz	Lpi.
		70	140	210	280					
4200										
26										
4210										
27										
4220										
28										
4230										
29										
4240										
30										
4250										
31										
4260										
32										
4270										
33										
4280										
34										
4290										
35										
4300										
36										

## CATALOG OF SOH 2 CORE

	R00	Lithology	Descriptions
	4200		1) VOLCANICLASTICS, altered, fine grained, mottled, dark/light gray green unit completely altered to smectite; 288 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
	4210		1) VOLCANICLASTICS, lithology as in unit 1 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
	4220		1) VOLCANICLASTICS, lithology as in unit 1 above; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
	4230		1) VOLCANICLASTICS, lithology as in unit 1 above; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE, white fibrous ZEOLITES.
	4240		1) VOLCANICLASTICS, lithology as in unit 1 above; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
	4250		1) VOLCANICLASTICS, altered, mottled dark/light gray green or metallic red in color completely altered to smectite; 299 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, ZEOLITES: analcime, GYPSUM/ANHYDRITE. XRD: analcime + chlorite, or randomly interstratified trioctal smectite-chlorite; analcime + trace cc(?).
	4260		1), 3) VOLCANICLASTICS, altered, fine grained, mottled, dark/light gray green unit completely altered to smectite; 132, 121 cm. 2) Dike(?), altered, greenish black aphanitic chips at the top of a core run; 5 cm. Secondary Mineralogy: SMECTITE-CHLORITE, .
	4270		1) VOLCANICLASTICS, altered, fine grained, mottled dark/light gray green and metallic red in color, altered to smectite; 280 cm. Secondary Mineralogy: SMECTITE-CHLORITE (looks like slickensides), white fibrous ZEOLITES, GYPSUM/ANHYDRITE.
	4280		1) VOLCANICLASTICS, altered, mottled dark/light gray green in color, altered to smectite; 212 cm. 2) Dike, < 1% olivine phenocrysts and microphenocrysts altering to clay, 1-3% plagioclase blades and microphenocrysts in a microcrystalline feldspathic gray matrix; 73 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, SMECTITE-CHLORITE, GYPSUM/ANHYDRITE, CALCITE, fibrous white ZEOLITES.
	4290		1), 2), 3) DIKE, <1% altered olivine phenocrysts in a gray microcrystalline feldspathic matrix; 19, 19, 154 cm. 4) Volcaniclastics, altered, mottled green gray/dark gray in color, altering to smectite; 83 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, SMECTITE-CHLORITE. XRD: ZEOLITES: analcime; anhydrite, thompsonite.
	4300		1) VOLCANICLASTICS, altered, mottled green gray, dark gray, white in color, altering to smectite; 291 cm. Secondary Mineralogy: ZEOLITES: analcime, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.



Depth	Temp (C)	
Feet	70	Sm-Cl
30X	140	Zeol.
	210	Fe-S
	280	Cal.
		An/Gy
		An/Si
		X/Qtz
		Epi.

4300	36		4300	1) VOLCANICLASTICS, altered, mottled green gray, dark gray, white in color, altering to smectite; 291 cm. Secondary Mineralogy: analcime, GYPSUM/ANHYDRITE, and white fibrous ZEOLITES (?), SMECTITE-CHLORITE.
4310	37		4310	1) VOLCANICLASTICS, altered, green, gray, dark gray in color, altering to smectite. Black glass shards present; 294 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE or ZEOLITES, SMECTITE-CHLORITE.
4320	38		4320	1) VOLCANICLASTICS, altered, mottled gray green, pale maroon brown, dark gray in color altered to smectite, unit is indurated; 286 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES: natrolite, analcime, GYPSUM/ANHYDRITE. XRD: anhydrite analcime.
4330	39		4330	1) VOLCANICLASTICS, altered, fine grained, mottled, dark/light gray green unit completely altered to smectite. Unit is hard and indurated at top, grades to less metamorphosed at bottom; 290 cm. Secondary Mineralogy: ZEOLITES: analcime, GYPSUM/ANHYDRITE, linear habit SMECTITE-CHLORITE.
4340	40		4340	1) VOLCANICLASTICS, altered, mottled dark gray and green gray in color, darker than above units, very indurated, altered to smectite; 279 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, ZEOLITES: analcime, CALCITE, SMECTITE-CHLORITE.
4350	41		4350	1) VOLCANICLASTICS, lithology as in unit 1 above; 274 cm. Secondary Mineralogy: Linear habit SMECTITE-CHLORITE, GYPSUM/ANHYDRITE.
4360	42		4360	1), 3), 5), 7) VOLCANICLASTICS, lithology as in unit 1 above; 11, 198, 7, 39 cm. 2), 4), 6) Sediment, very fine grained, compacted sediments with 5-10% basaltic sand, gray brown in color; 1.5, 2, 7 cm. Secondary mineralogy: GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4370	43		4370	1) VOLCANICLASTICS, altered, fine grained, swirled "marble cake" texture, light and dark gray green completely altered to smectite; 274 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4380	44		4380	1) VOLCANICLASTICS, altered, fine grained, mottled, dark/light gray green, unit completely altered to smectite; 292 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4390	45		4390	1) VOLCANICLASTICS, lithology as in unit 1 above; 238 cm. 2) Pillow Lava, altered, vesicular 30%, 1 mm; without visible phenocrysts, groundmass is altered toward smectite but retains pillow lava structures. Unit is gray with 100% of vesicles filled with dark gray clay; 45 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, GYPSUM/ANHYDRITE.
4400	46		4390	1) PILLOW LAVA, vesicular 15%, 1 mm; aphyric, dark gray basalt separated from the next pillow lava by very fine grained volcaniclastics altered to gray green smectite and indurated. 86 cm. 2), 3), 4) Pillow Lava, lithology as in unit 1; 53, 73, 82 cm. Secondary Mineralogy: CALCITE, SMECTITE-CHLORITE.
4400	47		4400	1) PILLOW LAVA, see next page for unit description.

## CATALOG OF SOH 2 CORE

Depth Feet	BOX	Temp (C) 70 140 210 280	Sp-Ci Fe-S Col/Gy Am/Si X/Qtz Epi.	ROD	Lithology	Descriptions
4400	47					1), 2) PILLOW LAVA, vesicular 15%, 1 mm; aphyric, dark gray basalt separated from the next pillow lava by very fine grained volcanoclastics altered to dark gray green smectite and indurated. 33, 196 cm. 3) Pillow Lava, lithology as in unit 1, less alteration shows texture better, vesicle % increases to 30%, texture is microcrystalline, diktytaxitic; 58 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4410	48					1), 2), 3), 4) PILLOW LAVA, vesicular 25%, 1 mm; aphyric dark gray microcrystalline, diktytaxitic basalt separated from the next unit by very fine grained volcanoclastics altered to gray clay and indurated; 199, 25, 28, 43 cm. Secondary Mineralogy: white fibrous ZEOLITES, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4420	49					1), 3), 4), 5), 6) PILLOW LAVA, lithology as in unit 1 above; 18, 62, 62, 117, 32 cm. 2) Massive anhydrite, hydrated on existing fracture, contains angular pillow lava clasts; 25 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
4430	50					1), 2), 3), 4), 5) PILLOW LAVA, lithology as in unit 1 above, separated from the next pillow lava by fine grained volcanoclastite altered to gray clay and indurated; 41, 94 47, 46, 27 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4440	51					1), 2), 3), 4), 5), 6) PILLOW LAVA, lithology as in unit 1 above; 27, 57, 19, 21, 68, 55 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4450	52					1), 3), 5) PILLOW LAVA, vesicular 25%, 1 mm; gray diktytaxitic, feldspathic basalt, 2-4 cm volcanoclastics at contacts; 226, 19, 31 cm. 2), 4) Dike, sparsely vesicular 10%, 3 mm; gray aphyric, aphanitic basalt. Intrudes at pillow lava contacts; 2, 10 cm. 2<3 = 60, 3<4 = 55, 4<5 = 0 degrees. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
4460	53					1), 2), 3), 5), 8) PILLOW LAVA, lithology as in unit 1 above; 60, 30, 17, 17, 152 cm. 4), 6), 7) Dike, sparsely vesicular, 10%, 2 mm; gray aphyric, aphanitic basalt. Intrudes at pillow lava contacts; 10, 6, 30 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
4470	54					1) PILLOW LAVA, vesicular 30%, 1 mm; diktytaxitic, feldspathic basalt. Groundmass alteration increases through last 70 cm of box to complete smectite; 300 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4480	55					1) PILLOW LAVA, vesicular 5-25%, <1% olivine phenocrysts in a highly altered green groundmass; 264 cm. 2) Pillow Lava, vesicular 30%, aphyric, gray feldspathic matrix; 10 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, SMECTITE-CHLORITE, ZEOLITES, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
4490	56					1), 3), 5) PILLOW LAVA, vesicular 20-30%, <1% olivine phenocrysts in a gray feldspathic matrix; 17, 106, 147 cm. 2), 4) Dike, <1% olivine phenocrysts and olivine-plagioclase intergrowths, <1% and plagioclase laths, in a gray aphanitic matrix; 4, 17 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE. XRD: mordenite.
4500	57					1), 2), 3) PILLOW LAVA, vesicular 30%, 1 mm; vesicles filled with black clay, diktytaxitic, feldspathic basalt, gray clay at contacts; 156, 57, 74 cm. 2<3 has gypsum matrix. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE. See next page for description of BOX 58.



## CATALOG OF SOH 2 CORE

Depth Feet	BOX	Temp (C) 70 140 210 280	Sn-Ci Zeo-S Fe-S Col An/Gy Am/St X/Qtz Epi	ROD	Lithology	Descriptions
4500	58					1), 2), 4), 5), 6) PILLOW LAVA, vesicular 7-15%, <1% olivine microphenocrysts, in a gray feldspathic to diktytaxitic matrix; 123, 30, 14, 63, 27 cm. 3) DIKE, a vesicular, <<1% olivine microphenocrysts and plagioclase microphenocrysts, in a gray aphanitic matrix 18 cm. 7) Breccia, pillow lava clasts suspended in gypsum; 5 cm. Secondary Mineralogy: ZEOLITES: natrolite, GYPSUM/ANHYDRITE FE-SULFIDES: pyrite, SMECTITE-CHLORITE.
4510	59					1) PILLOW LAVA, vesicular 25%, 1 mm; gray diktytaxitic, feldspathic basalt, 2-4 cm gray clay at contacts; 39 cm. 2), 3), 4), 5), 6), 7) Pillow Lava, lithology as in unit 1; 34, 25, 37, 59, 56, 16 cm; Secondary Mineralogy: FE-SULFIDES: pyrite, massive GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4520	60					1), 3) PILLOW LAVA, lithology as in unit 1 above; 154, 112 cm. 2) DIKE, a vesicular, <1% plagioclase blades and laths, gray aphanitic basalt; 15 cm. Secondary Mineralogy: ZEOLITES: analcime, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4530	61					1), 2), 4), 5), 7) PILLOW LAVA, vesicular 10-25%, <1% olivine microphenocrysts, in a gray feldspathic matrix; 185, 7, 15, 26, 24 cm. 3), 6) DIKE, a vesicular, <<1% olivine microphenocrysts and plagioclase microphenocrysts, in a gray aphanitic matrix intruding along pillow contact; 4, 5 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, FE-SULFIDES: pyrite, ZEOLITES: natrolite.
4540	62					1), 3), 4), 5), 7), 9) PILLOW LAVA, lithology as in unit 1 above; 53, 52, 80, 12, 51, 10 cm. 2), 6), 8) DIKE, lithology as in unit 3 above; 10, 5, 13 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
4550	63					1), 3), 4), 5) PILLOW LAVA, lithology as in unit 1 above; 4 cm gray clay at contacts; 13, 83, 51, 74 cm. 1<2 = 75 degrees. 2), 6) DIKE, a vesicular, <1% plagioclase blades and laths in a gray aphanitic groundmass; 45, 15 cm. 2<3 = 55, 5<6 = 50 degrees. 6) DIKE, lithology as in unit 2; 15 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4560	64					1), 3), 4) Pillow Lava, lithology as in unit 1 above; 18, 65, 38 cm 1<2 = 20 degrees. 2) DIKE, lithology as in unit 2 above; 5 cm. 1<2 = 20, 3<4 = 45, 4<5 = 65 degrees. 5) DIKE, microvesicular, 15%, <1 mm, vesicles filled with black clay, <1% plagioclase laths in a gray feldspathic groundmass; 148 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
4570	65					1) DIKE, vesicular 10%, 2 mm; near contact, plagioclase laths 1% in a brecciated feldspathic gray groundmass; 68 cm. 2), 3) PILLOW LAVA, lithology as in unit 1 above; 78, 142 cm. First 45 cm brecciated, black clay matrix. Secondary Mineralogy: FE-SULFIDES: pyrite, SMECTITE-CHLORITE, abundant GYPSUM/ANHYDRITE.
4580	66					1), 2), 3) PILLOW LAVA, vesicular, 25%, 1 mm; aphyric diktytaxitic feldspathic gray basalt, 4 cm gray clay at contacts; 83, 33, 187 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, massive GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4590	67					1), 2), 3), 4), 5) PILLOW LAVA, lithology as in unit 1 above; 38, 48, 47, 60, 100 cm. Breccia surrounding unit 2 has gypsum matrix. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, massive GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4600	68					1) Pillow Lava, lithology as in unit 1 above; 50 cm. 1<2 = 60 degrees. 2) DIKE, pipe vesicles, 2-3 cm long at 50 degrees, 3% olivine phenocrysts and olivine plagioclase intergrowths, 75% altered to brown clay, 5% plagioclase laths in an aphanitic dark gray brecciated groundmass; 221 cm. Secondary Mineralogy: FE-SULFIDES, ZEOLITES, GYPSUM/ANHYDRITE.

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CATALOG OF SOH 2 CORE												
Depth	BOX	Temp (C)						ROD	Lithology	Descriptions		
		70	140	210	280	Sr-Cl Zeol.	Ca-S Fels.	An-Gy Am-St X/Otz Epi.				
4600												
69												1) DIKE, vesicular, 5%, 2 mm; mostly near contact, 3% olivine phenocrysts, microphenocrysts, olivine-plagioclase intergrowths 75% altered to brown clay, 5% plagioclase blades, laths, and microphenocrysts in an aphanitic dark gray groundmass; 79 cm.. 1<2 = 80 degrees. 2) Dike, microvesicular, 5%, 0.1 mm; <1% plagioclase blades and laths in a light gray aphanitic groundmass; 195 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, massive CALCITE.
4610												1) DIKE, lithology as in unit 2 above, 50% of microvesicles filled with hyaline opal; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, AMORPHOUS SILICA: opal.
4620												1) DIKE, lithology as in unit 2 above; 258 cm. 1<2 = 85 degrees. 2) Breccia, clasts vesicular 25%, 1 mm; 1% olivine phenocrysts and olivine-plagioclase intergrowths altered to brown clay, 3% plagioclase laths in a dark gray aphanitic groundmass; 16 cm.. Thin matrix is black clay. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, AMORPHOUS SILICA: opal.
4630												1) DIKE, a vesicular, aphyric gray basalt; 6 cm. 1<2 = 60 degrees.. 2) DIKE, pipe vesicles 13 cm long, 5 mm diameter, top 30 cm of unit is brecciated, matrix is black clay. 1% olivine microphenocrysts and 5% plagioclase laths in an aphanitic gray groundmass; 198 cm. 1<2 = 0 degrees. 3), 4), 5), 6) Pillow Lava, vesicular 25%, 1 mm; aphyric diktytaxitic gray basalt, 4 cm black clay at contacts; 29, 28, 54, 21 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4640												1) Volcaniclastics, black clay matrix supports clasts with lithologies belonging to dike and pillow lava units described below; 43 cm. 1<2 = 80 degrees. 2) DIKE, pipe vesicles 4 cm long, 5 mm diameter, most horizontal; 1% olivine microphenocrysts, 5% plagioclase laths in a gray aphanitic groundmass; 238 cm. 2<3 = 80 degrees. 3) Pillow Lava, vesicular 25%, 1 mm; aphyric diktytaxitic gray basalt; 21 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
4650												1), 3), 5), 7) PILLOW LAVA, lithology as in unit 3 above; 20, 43, 28, 60 cm. 2) Volcaniclastics, lithology as in unit 1 above; 26 cm. 4), 6) Volcaniclastics, altered to black clay and indurated. No clasts. 29, 85 cm. Secondary Mineralogy: ZEOLITES: abundant analcime, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE. XRD: analcime.
4660												1) PILLOW LAVA, lithology as in unit 3 above; 31 cm. 2), 4) Pillow Lava, vesicles filled with black clay or gypsum, 5-7% altered olivine phenocrysts in a smectite matrix; 127, 30 cm. 3) Volcaniclastics, altered to pale green smectite, clasts with lithologies as in unit 2; 86 cm. Secondary Mineralogy: SMECTITE-CHLORITE, GYPSUM/ANHYDRITE.
4670												1) VOLCANICLASTICS, lithology as in unit 3 above; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES: analcime.
4680												1) VOLCANICLASTICS, lithology as in unit 3 above; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
4690												1) VOLCANICLASTICS, lithology as in unit 3 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES: analcime, GYPSUM/ANHYDRITE.
4700												1) VOLCANICLASTICS, lithology as in unit 3 above; 244 cm. 1<2 = 80 degrees. 2) Dike, a vesicular, 15% plagioclase laths in a dark gray aphanitic groundmass; 30 cm. Secondary Mineralogy: SMECTITE-CHLORITE.



CATALOG OF SOH 2 CORE																
Depth	Feet	BOX	Temp (C)				ROD						Lithology	Descriptions		
			70	140	210	280	Sm-Cl	Zeol.	Fe-S	Calc	An/Gy	Am/Si	X/Qtz	Epi.		
	4700	79														2) DIKE, see previous page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, white vesicle filling.
		80														1) DIKE, a vesicular, 15% plagioclase blades, laths, rhombs and microphenocrysts increases to 25% downward through box; <1% olivine microphenocrysts altered black; rare pyrite phenocrysts (?) may be altered olivine; all in an increasingly diktytaxitic light gray matrix. 274 cm. Secondary Mineralogy: AMORPHOUS SILICA, FE-SULFIDES: pyrite.
	4710															
		81														1), 3) DIKE, sparsely vesicular, 5%, 2 mm; 25% plagioclase laths, blades, rhombs and microphenocrysts, <1% olivine microphenocrysts altered black in diktytaxitic light gray matrix; 213, 21 cm. 2) DiKE, a vesicular, 1% plagioclase blades and laths in a gray aphanitic matrix. Top contact is distinct, bottom barely discernible. Unit becomes more diktytaxitic toward bottom; 49 cm. 1<2 = 60, 2<3 = 55 degrees. Secondary Mineralogy: QUARTZ CRYSTALS.
	4720															
		82														1) DIKE, sparsely vesicular 5%, 2 mm; plagioclase % drops through box but unit becomes gross grained, holocrystalline, segregated into plagioclase, olivine (unaltered), and augite. Vesicles are filled with black clay. Bottom dip lost in rubble at contact; 164 cm. 2) DiKE, microvesicular 15%, <1 mm; 7% plagioclase blades, laths, rhombs and microphenocrysts in a dark gray aphanitic matrix somewhat altered to smectite; 110 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
	4730															
		83														1) DIKE, microvesicular 5%, <1 mm; 1% plagioclase blades and laths in a dark gray aphanitic matrix altered to smectite; 97 cm. 1<2 = 55 degrees. 2) DiKE, microvesicular 5%, <1 mm; 25% plagioclase blades, laths, rhombs, and microphenocrysts in a gray matrix which is aphanitic at top contact but becomes pronouncedly diktytaxitic through the box; 162 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
	4740															
		84														1) DIKE, sparsely vesicular 5%, 2 mm; 25% plagioclase blades, laths, rhombs, and microphenocrysts in a light gray diktytaxitic matrix; 305 cm. Secondary Mineralogy: common FE-SULFIDES: pyrite.
	4750															
		85														1) DIKE, lithology as in unit 1 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES: pyrite.
	4760															
		86														1) DIKE, lithology as in unit 1 above; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.
	4770															
		87														1) DIKE, lithology as in unit 1 above; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.
	4780															
		88														1) DIKE, lithology as in unit 1 above; 290 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
	4790															
		89														1) DIKE, sparsely vesicular 5%, 2 mm; First 90 cm of box, grades to a vesicular; 25% plagioclase blades, laths, rhombs, and microphenocrysts in a light gray diktytaxitic matrix grades to holocrystalline texture last 120 cm of box; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.
	4800															
																1) DIKE, a vesicular, 50% plagioclase blades, laths, rhombs, and microphenocrysts form a felted, seriate, holocrystalline texture. Crystals are plagioclase, augite and olivine; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.



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CATALOG OF SOH 2 CORE												
Depth	BOX	Temp (C)				Geochem				ROD	Lithology	Descriptions
Feet		70	140	210	280	Si-CI	Fe-S	Al-S	Ca-S			
4800	90											1) DIKE, see previous page for unit description. Secondary Mineralogy: FE-SULFIDES: pyrite.
	91											1) DIKE, vesicular, 50% plagioclase blades, laths, rhombs and microphenocrysts form felted seriate texture enclosing augite and olivine crystals, unit is holocrystalline black and white gabbro; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
4810												1) DIKE, lithology as in unit 1 above; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE. XRD: anhydrite.
	92											
4820												1) DIKE, lithology as in unit 1 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
	93											
4830												1) DIKE, becomes sparsely vesicular 50% through box, 5%, 2 mm; 35% plagioclase blades, laths, rhombs and microphenocrysts in a unit which grades from holocrystalline to densely phyric diktytaxitic gray basalt; 290 cm. Vesicles filled with black clay. Secondary Mineralogy: SMECTITE-CHLORITE.
	94											
4840												1) DIKE, sparsely vesicular 5%, 2 mm; 25% plagioclase blades, laths, rhombs and microphenocrysts in a light gray diktytaxitic matrix; 274 cm. Vesicles filled with black clay. Secondary Mineralogy: SMECTITE-CHLORITE, abundant FE-SULFIDES: pyrite.
	95											
4850												1) DIKE, sparsely vesicular 7%, 1 mm; 25% plagioclase blades, laths, rhombs and microphenocrysts in a light gray diktytaxitic matrix; 305 cm. Vesicles filled with black clay. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
	96											
4860												1) DIKE, sparsely vesicular 10%, <1 mm; 25% plagioclase blades, laths, rhombs and microphenocrysts in a light gray diktytaxitic matrix; 274 cm. Vesicles filled with black clay. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
	97											
4870												1) DIKE, microvesicular 5%, <1 mm; 25% plagioclase blades, laths, rhombs and microphenocrysts in a light gray diktytaxitic matrix; 290 cm. Larger vesicles filled with black clay. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
	98											
4880												1) DIKE, vesicular 5%, <1 mm; 25% plagioclase laths, 7-10% olivine-plagioclase intergrowths last 30 cm of unit, in a gray diktytaxitic matrix; 160 cm. 1<2 = 50 degrees. 2) Volcaniclastics, altered to smectite and brecciated to rubble; 5-7% olivine phenocrysts altered to black clay visible in a dark gray green matrix; 130 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
	99											
4890	100											1) VOLCANICLASTICS, lithology as in unit 2 above; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE massive GYPSUM/ANHYDRITE.
4900	101											1) VOLCANICLASTICS, lithology as in unit 2 above; 244 cm. Secondary Mineralogy: SMECTITE-CHLORITE GYPSUM/ANHYDRITE.

Depth  
Feet

BOX

70 140 210 280

Temp (C)

Sn-Ci  
Feol.  
Fe-S  
Col.  
An/Gy  
An/Si  
X/Otz  
Epi.

4900

101

4910

102

103

4920

104

4930

105

4940

106

4950

107

4960

108

4970

109

4980

110

4990

111

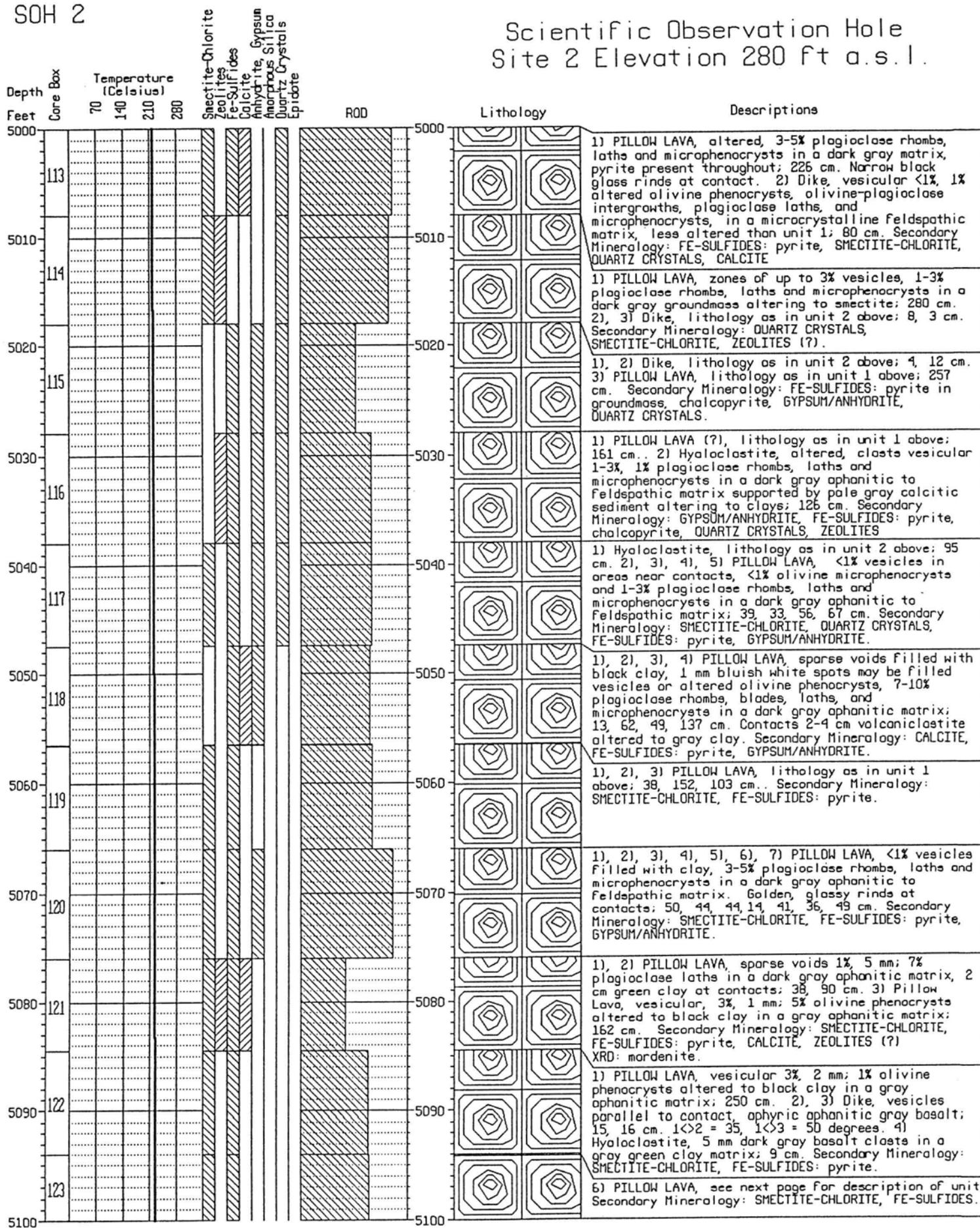
112

5000

113

[illegible]

Scientific Observation Hole  
Site 2 Elevation 280 ft a.s.l.





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CATALOG OF SOH 2 CORE											
Depth	BOX	Temp (C)				ROD				Lithology	Descriptions
Feet		70	140	210	280	Sn-Cu	Fe-S	Al-Si	Ca-Mg		
5100	123										11, 31, 51 Hyaloclastite, aphyric, aphanitic, vesicular dark gray basalt clasts in gray green clay; 30, 22, 18 cm. 21, 41, 61 PILLOW LAVA, vesicular areas 20%, 1 mm, aphyric, aphanitic gray basalt; 46, 151, 28 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
5110	124										11 PILLOW LAVA, vesicular areas 15%, 2 mm; aphyric gray basalt grades from aphanitic to diktytaxitic holocrystalline texture; 290 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, abundant FE-SULFIDES: pyrite,
5120	125										11, 31 PILLOW LAVA (?), 10-15% plagioclase laths, 5% altered olivine microphenocrysts and olivine-plagioclase intergrowths, and <1% augite blades in a dark gray diktytaxitic matrix; 170, 78 cm. 1<2 = 60 degrees. 21, 41 DIKE, <1% vesicles, <<1 mm; <1% olivine microphenocrysts and plagioclase laths in a blue-gray aphanitic-feldspathic matrix, dark clays at contact; 7, 5 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
5130	126										11, 21, 31, 51 DIKE, lithology as in unit 2 above; 5, 18, 21, 7 cm. Chill rinds and green clay at contacts. 41 DIKE (?), 1% olivine microphenocrysts, 10% plagioclase laths, and <1% augite in a holocrystalline matrix; 41 cm. 5<6 = 60 degrees. 61 DIKE, sparsely vesicular, 1% olivine microphenocrysts and 3% plagioclase laths in a holocrystalline matrix; 196 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, QUARTZ CRYSTALS, GYPSUM/ANHYDRITE.
5140	127										11 DIKE, sparsely vesicular, 1%, 3 mm; aphyric diktytaxitic holocrystalline gray basalt; 305 cm. Secondary Mineralogy: QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5150	128										11 DIKE, lithology as in unit 1 above, intrudes unit 2; 145 cm. 1<2 = 65 degrees. 21 DIKE, 1% plagioclase laths in a holocrystalline matrix; 130 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
5160	129										11 DIKE, vesicular, 1% plagioclase laths in a gray feldspathic, diktytaxitic matrix; 139 cm. 21 Carbonate Mud, light gray matrix supports <1 mm angular basalt clasts rimmed with calcite; 15 cm. 1<2 = 60, 2<3 = 20 degrees. 31 DIKE, vesicular, <1% olivine phenocrysts and microphenocrysts altered to black clay, and plagioclase laths in a gray aphanitic matrix; 120 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, FE-SULFIDES: pyrite, CALCITE.
5170	130										11, 21, 31, 51 PILLOW LAVA, altered, <1% altered olivine and plagioclase microphenocrysts in a gray feldspathic matrix, gold-green on fractures; 109, 37, 23, 128 cm. 41 DIKE, <<1% vesicles, <1% olivine microphenocrysts and 1% plagioclase laths in a gray feldspathic matrix, intrudes pillow lava pile; 28 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES: natrolite (?), AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5180	131										11 Pillow Lava, vesicular, <1% olivine phenocrysts in a dark gray aphanitic matrix; 43 cm. 21 Volcaniclastics, altered to gray green clay; 26 cm. 2<3 = 45 degrees. 31, 41 DIKE, vesicular, <1% olivine phenocrysts altered to black clay, <1% plagioclase laths in a dark gray aphanitic matrix; 146, 70 cm. 3<4 = 45, 4<5 = 35 degrees. 51 Pillow Lava, vesicular, aphyric, diktytaxitic, feldspathic gray basalt; 4 cm. Secondary Mineralogy: AMORPHOUS SILICA, FE-SULFIDES: pyrite.
5190	132										11 PILLOW LAVA, vesicular, <1% olivine microphenocrysts and olivine-plagioclase intergrowths altered to black clay in a diktytaxitic gray matrix; 274 cm. Secondary Mineralogy: QUARTZ CRYSTALS, massive GYPSUM/ANHYDRITE.
5200	133										11 PILLOW LAVA, lithology as in unit 1 above; 305 cm. Secondary Mineralogy: AMORPHOUS SILICA, GYPSUM/ANHYDRITE. See next page for BOX 134.

## CATALOG OF SOH 2 CORE

Depth Feet	BOX	Temp (C) 70 140 210 280	Se-Gl Feol. Fe-S Col Am/Gy An/Si X/Qtz Epi.	ROD	Lithology	Descriptions
5200	134					1), 3), 4) PILLOW LAVA, a vesicular, <1% olivine microphenocrysts and olivine-plagioclase intergrowths altered to black clay, in a fractured gray slightly diktytaxitic matrix; gold chill rinds at contacts; 46, 145, 90 cm. 2) Volcaniclastics, altered to gray green clay; 10 cm. Secondary Mineralogy: QUARTZ CRYSTALS, massive GYPSUM/ANHYDRITE.
5210	135					1), 3), 5) PILLOW LAVA, <1% olivine phenocrysts and plagioclase laths in a fractured, gray aphanitic groundmass, golden glassy rinds at contacts; 23, 110, 114 cm. 2), 4) Hyaloclastite, angular clasts of pillow lava suspended in fine sediment altered to green clay; 10, 22 cm. Secondary Mineralogy: CALCITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
5220	136					1), 3), 5), 7), 9) PILLOW LAVA, lithology as in unit 1 above; 25, 45, 76, 20, 28 cm; 2), 4), 6), 8) Hyaloclastite, lithology as in unit 2 above; 12, 7, 22, 8 cm. Secondary Mineralogy: SMECTITE, QUARTZ CRYSTALS, ZEOLITES. XRD: mordenite + CALCITE.
5230	137					1) PILLOW LAVA, vesicular, <1% olivine microphenocrysts and olivine plagioclase intergrowths altered to black clay, in an aphanitic gray matrix; 176 cm. 2) Volcaniclastics, clasts vesicular 15%, 2 mm; 50% of vesicles filled with calcite or quartz, matrix is gray green clay; 116 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, AMORPHOUS SILICA, GYPSUM/ANHYDRITE, QUARTZ CRYSTALS.
5240	138					1) PILLOW LAVA, Fractured and brecciated at the top and bottom of the box, <1% olivine phenocrysts and microphenocrysts in a dark gray feldspathic groundmass; 259 cm. Secondary Mineralogy: SMECTITE-CHLORITE, GYPSUM/ANHYDRITE.
5250	139					1) PILLOW LAVA (?), 4-10% vesicles, <<1% olivine microphenocrysts in a dark gray aphanitic to feldspathic groundmass. Fractured and brecciated at top; 229 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES: natrolite (?), GYPSUM/ANHYDRITE (?).
5260	140					1) PILLOW LAVA (?), 15% vesicles, <<1% olivine microphenocrysts in a gray aphanitic to slightly feldspathic groundmass fractured throughout; 274 cm. Secondary Mineralogy: ZEOLITES: natrolite (?), FE-SULFIDES: pyrite, SMECTITE-CHLORITE, massive CALCITE.
5270	141					1) PILLOW LAVA (?), 10% vesicles, aphyric gray aphanitic to feldspathic fractured groundmass; 89 cm. 2) Pillow Lava (?), 5% vesicles, lithology as in unit 1; 183 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, ZEOLITES: natrolite (?), FE-SULFIDES: pyrite.
5280	142					1) PILLOW LAVA, 1 - 3% vesicles, lithology as in unit 1 above; 222 cm. 2) Pillow Lava, 10% vesicles, lithology as in unit 1 above; 35 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES, GYPSUM/ANHYDRITE. XRD: chlorite-smectite < 80% chlorite, analcime, trace QUARTZ CRYSTALS, trace feldspar (?), plagioclase.
5290	143					1) PILLOW LAVA (?), top 210 cm. vesicular 30%, R, 1 mm: vesicles filled with white clay, 5% olivine phenocrysts altered to black iridescence in a gray aphanitic matrix somewhat altered to clay, grades into open vesicles 15%, SA, 2 mm, aphyric, diktytaxitic gray matrix also somewhat altered; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES: pyrite.
5300	144					1) PILLOW LAVA (?), lithology as in bottom of unit 1 above, becomes 30% vesicular R, 1 mm, filled with black or white clay, 1% olivine phenocrysts and matrix altered as in unit 1 above; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.



Depth  
Feet

# CATALOG OF SOH 2 CORE

Feet	BOX	70	Temp (C)	140	210	280	Sn-Cl	Zeol.	Fe-S	Am/Gy	Am/St	X/Qtz	Epi.	ROD	Lithology	Descriptions
5300	144															1) PILLOW LAVA (?), see previous page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
5310	145															1) PILLOW LAVA (?), vesicular 30%, 1 mm, 100% of vesicles filled with greenish white clay; 1% olivine phenocrysts altered to black iridescence in an aphanitic dark gray matrix greatly altered toward smectite; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
5320	146															1), 2) PILLOW LAVA, vesicular 7-10%, 100% filled with smectite; <1% olivine phenocrysts in a dark gray feldspathic matrix, red clay at contacts; 135, 136 cm. Secondary Mineralogy: FE-SULFIDES: pyrite cubes, SMECTITE-CHLORITE.
5330	147															1) PILLOW LAVA (?), vesicular 30%, 1 mm; 100% of vesicles filled with white or black clay, 1% olivine phenocrysts altered to black iridescence in a dark gray aphanitic matrix somewhat altered toward smectite; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
5340	148															1) PILLOW LAVA (?), lithology as in unit 1 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, GYPSUM/ANHYDRITE.
5350	149															1) PILLOW LAVA (?), lithology as in unit 1 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: chalcopryite.
5360	150															1), 3) PILLOW LAVA, 10% vesicles in a gray aphanitic to feldspathic groundmass; 38, 198 cm. 1<2 = 65 degrees. 2) Dike, 1-3% olivine phenocrysts, <1% olivine plagioclase intergrowths and plagioclase laths in a blue-gray feldspathic groundmass; 30 cm. 2<3 = 60 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES: pyrite.
5370	151															1) PILLOW LAVA (?), vesicular 30%, 1 mm; 100% of vesicles filled with black or white clay, 1% olivine phenocrysts altered to black iridescence in a dark gray matrix well altered toward smectite; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
5380	152															1), 2), 3), 4), 6), 7) PILLOW LAVA, vesicular 10-15%, 100% filled with smectite, dark gray aphanitic basalt. Zones of fracturing and rubble; 20, 132, 61, 36, 9, 18 cm. 5) Volcaniclastics, altered, fractured, and mineralized; 8 cm. Secondary Mineralogy: massive CALCITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, SMECTITE-CHLORITE.
5390	153															1) PILLOW LAVA, vesicular, 30%, 1 mm at top, grades to 5%, 5 mm last 60 cm, 100% of vesicles filled with black or white clay, 1% olivine phenocrysts altered to black iridescence in a dark gray matrix well altered toward smectite; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
5400	154															1) PILLOW LAVA, lithology as in unit 1 above, but completely altered to smectite and partly crushed to sandy rubble; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
	155															1) PILLOW LAVA, lithology as in unit 1 above, but completely altered to smectite and partly crushed to sandy rubble; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

CATALOG OF SOH 2 CORE															
Depth	Feet	BOX	Temp (C)				ROD						Lithology	Descriptions	
			70	140	210	280	Sn-Cl	Zeol.	Fe-S	Cal	Am/By	Ar/Si	X/Qtz	Epi.	
5400															5400
	155														1) PILLOW LAVA, altered, vesicular 30%, 1 mm; 100% Filled with black clay, 1% olivine phenocrysts and microphenocrysts altered to black iridescence in a dark gray matrix partly crushed to sandy rubble; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
5410	156														5410
															1) PILLOW LAVA, 1-3% vesicular, 100 % Filled with smectite, 1-4% olivine phenocrysts and microphenocrysts in a green-gray aphanitic to feldspathic groundmass altered to smectite; 158 cm. Secondary Mineralogy: massive CALCITE, SMECTITE-CHLORITE.
5420	157														5420
															1), 2), 3), 4) PILLOW LAVA, vesicular 5%, oriented at 40 degrees; <1% olivine phenocrysts in a gray aphanitic groundmass; 77, 65, 7, 68 cm. Green clay at contacts, red clay at 3<>4. 5) Pillow Lava, a vesicular, 1% olivine phenocrysts and olivine-plagioclase intergrowths in a gray feldspathic groundmass; 60 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
5430	158														5430
															1) PILLOW LAVA, a vesicular, 3% olivine phenocrysts and olivine-plagioclase intergrowths, altered black in a fractured dark gray aphanitic matrix altered toward smectite and crushed to rubble; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
5440	159														5440
															1) PILLOW LAVA, a vesicular, 3% olivine microphenocrysts and olivine-plagioclase intergrowths relatively unaltered in a dark gray aphanitic matrix somewhat fractured and altered toward smectite; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
5450	160														5450
															1), 4) Pillow Lava, <1% olivine-plagioclase intergrowths in a gray feldspathic groundmass; 22, 53 cm. 1<>2 = 35 degrees. 2) DIKE, a vesicular, 1% olivine phenocrysts in a gray feldspathic groundmass. Intrudes pillows; 49 cm. 3) Dike, 3% vesicles, <1% olivine phenocrysts and plagioclase laths in a gray diktytaxitic groundmass; 152 cm. 3<>4 = 40 degrees. Secondary Mineralogy: QUARTZ CRYSTALS, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
5460	161														5460
															1), 2), 3), 5), 6) PILLOW LAVA, a vesicular, 3% olivine phenocrysts and olivine-plagioclase intergrowths relatively unaltered, in a dark gray aphanitic matrix, black clay at contacts. Units 1+2+3 = 41 cm, 30, 190 cm. 4) Dike, sparsely vesicular at contacts, <1% plagioclase laths in a dark gray aphanitic matrix; 13 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5470	162														5470
															1), 2), 3), 4) PILLOW LAVA, a vesicular, 3% olivine-plagioclase intergrowths, slightly altered in a gray aphanitic matrix partly crushed to rubble; 28, 60, 90, 120 cm. Gold chill rinds. Secondary Mineralogy: SMECTITE-CHLORITE.
5480	163														5480
															1) PILLOW LAVA, lithology as in unit 1 above; 22 cm. 2), 3), 4) Pillow Lava, <1% olivine phenocrysts in a gray feldspathic matrix, highly fractured; 89, 67, 59 cm. 5) Volcaniclastics, clasts with lithology as in unit 2, in a clay matrix; 43 cm. Secondary Mineralogy: QUARTZ CRYSTALS, ZEOLITES, GYPSUM/ANHYDRITE.
5490	164														5490
															1), 2), 3), 4) PILLOW LAVA, a vesicular, <1% olivine microphenocrysts altered black in a dark gray aphanitic matrix partly crushed to rubble and slightly altered; 43, 58, 129, 60 cm. Secondary Mineralogy: QUARTZ CRYSTALS, GYPSUM/ANHYDRITE.
5500	165														5500
															1), 4) HYALOCLASTITE, 1 cm angular clasts in black clay; 90, 30 cm. 2) Pillow Lava, lithology as in unit 1 above; 59 cm. 3) Dike, 1% plagioclase laths in an aphanitic dark gray matrix; 80 cm. 3<>4 = 40 degrees. Secondary Mineralogy: FE-SULFIDES, SMECTITE-CHLORITE, GYPSUM/ANHYDRITE.

Depth Feet	BOX	Temp (C)				Sn-Cl Zeol.	Fe-S Calc.	An/Gy Cm	Am/Si X/Otz	Epi.	ROD
		70	140	210	280						
5500											
166											
5510											
167											
5520											
168											
5530											
169											
5540											
170											
5550											
171											
5560											
172											
5570											
173											
5580											
174											
5590											
175											
176											
5600											

# CATALOG OF SOH 2 CORE

## Lithology

## Descriptions

5500			1), 2), 3), 4), 5) PILLOW LAVA, <1% olivine phenocrysts and microphenocrysts in a gray microcrystalline feldspathic matrix, gold chill rinds and radial fractures at contacts; 68, 75, 51, 39, 40 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5510			1), 3), 4), 5), 6), 7), 9) PILLOW LAVA, lithology as in unit 1 above; 7, 69, 51, 47, 17, 17, 22 cm. 2), 8) DIKE, vesicular, 1% olivine phenocrysts and microphenocrysts, 1-2 % olivine-plagioclase intergrowths, <1% plagioclase laths and microphenocrysts in a gray feldspathic matrix. Thin chill rind at contacts; 5, 24 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES, QUARTZ CRYSTALS.
5520			1), 2), 3), 4) PILLOW LAVA, vesicular, <1% olivine microphenocrysts altered black in a dark gray aphanitic matrix partly altered and crushed to rubble. Gold chill rinds brecciated and infilled with black clay or anhydrite; 69, 120, 56, 60 cm. Secondary Mineralogy: QUARTZ CRYSTALS, GYPSUM/ANHYDRITE.
5530			1), 2), 3) PILLOW LAVA, lithology as in unit 1 above; 132, 114, 44 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS.
5540			1), 2), 3) PILLOW LAVA, <1% olivine microphenocrysts in a fractured gray feldspathic matrix; 99, 150, 43 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, GYPSUM/ANHYDRITE, CALCITE. XRD: plagioclase + quartz (?).
5550			1) PILLOW LAVA, lithology as in unit 1 above; 105 cm. 2) Pillow Lava (dike?), vesicular, 5% plagioclase laths in an aphanitic dark gray matrix; 36 cm. 3) Pillow Lava, vesicular, 3% plagioclase laths, 2% olivine-plagioclase intergrowths in a gray diktytaxitic feldspathic matrix, aphanitic near end of box; 149 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5560			1) PILLOW LAVA, lithology as in unit 3 above, unit is swirled in with unit 2 for 150 cm.; 106 cm. 2) Pillow Lava, vesicular 20%, 1 mm, 100% filled with green clay, 2% plagioclase laths, 1% olivine-plagioclase intergrowths in a diktytaxitic gray matrix slightly altered toward smectite; 168 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.
5570			1) PILLOW LAVA (dike?), vesicular 3%, 1% olivine phenocrysts, 1% plagioclase laths, and <1% olivine-plagioclase-pyrite intergrowths. Units 1 and 2 are mixed; 250 cm. 2) DIKE, vesicular, 3-5% olivine phenocrysts and <1% plagioclase microlaths in a gray aphanitic to feldspathic matrix; 47 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5580			1) DIKE, vesicular, 5% plagioclase microphenocrysts in a feldspathic, diktytaxitic gray matrix; 305 cm. Secondary Mineralogy: QUARTZ CRYSTALS.
5590			1), 3) DIKE, vesicular, 3% olivine phenocrysts, <1% olivine-plagioclase intergrowths, and 1-2% plagioclase laths in a dark gray aphanitic to feldspathic matrix; 27, 252 cm. 2) Pillow Lava (dike?), <1% vesicles, 1% olivine phenocrysts and olivine-plagioclase intergrowths, and 1-2% plagioclase laths in a gray diktytaxitic matrix; 11 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
5600			1) DIKE, see next page for unit description.



Depth		Temp (C)				
Feet	BOX	70	140	210	280	Sm-Cl Zeol. Fe-S Cal. An/Gy Am/Si X/Qtz Epi.

5600	176				5600	1) DIKE, vesicular, 1% plagioclase microphenocrysts in a feldspathic diktytaxitic gray matrix; 70 cm. 1<2 = 0 degrees. 2) DiKE, vesicular, 1% olivine microphenocrysts altered black, <1% plagioclase microphenocrysts in a light gray diktytaxitic feldspathic matrix; 144 cm. 2<3 = 35 degrees. 3) DiKE (?), sparsely vesicular, 5% 2 mm, 100% filled with white clay, <1% olivine microphenocrysts, <1% plagioclase laths in a mottled diktytaxitic feldspathic matrix slightly altered toward smectite; 45 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS.
5610	177				5610	1) PILLOW LAVA, vesicular <1%, 5 mm; 1% olivine phenocrysts, <1% plagioclase laths in a gray diktytaxitic matrix; 187 cm. 1<2 = 40 degrees. 2) DiKE, 2% olivine phenocrysts, <1% plagioclase laths in a gray aphanitic matrix altering to dark green/black clays; 109 cm. Secondary mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, QUARTZ CRYSTALS, GYPSUM/ANHYDRITE, and occasional albite (?).
5620	178				5620	1) DIKE, lithology as in unit 2 above; 198 cm. 2) Pillow Lava, vesicular, 1% plagioclase blades and laths in a gray green matrix altered toward smectite; 36 cm. 3) Pillow Lava, vesicular, 1% olivine-plagioclase intergrowths, 2% plagioclase laths in an aphanitic dark gray matrix; 40 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, SMECTITE-CHLORITE.
5630	179				5630	1), 2), 3) PILLOW LAVA, sparsely vesicular 5%, 1 mm; <1% olivine-plagioclase intergrowths, 2% plagioclase laths in slightly diktytaxitic gray matrix; 119, 51, 125 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, QUARTZ CRYSTALS, GYPSUM/ANHYDRITE.
5640	180				5640	1) Pillow Lava, lithology as in unit 1 above; 117 cm. 1<2 = 40 degrees. 2) DIKE, vesicular, <1% plagioclase microphenocrysts in a dark gray matrix aphanitic to diktytaxitic feldspathic; 173 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
5650	181				5650	1) DiKE, lithology as in unit 2 above; 54 cm. 2) PILLOW LAVA, <1% vesicles, 2-3% olivine phenocrysts, <1% plagioclase laths in a gray diktytaxitic matrix; 197 cm. 3) DiKE, lithology as in unit 2 above; 90 cm. 4) Pillow Lava, lithology as in unit 2; 6 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE FE-SULFIDES: pyrite, SMECTITE-CHLORITE, QUARTZ CRYSTALS.
5660	182				5660	1) DIKE, vesicular, aphyric dark gray aphanitic basalt; 3 cm. 2) Pillow Lava, vesicular 10%, 3 mm, 25% of vesicles filled with gray-green clay, 2% plagioclase laths in a diktytaxitic feldspathic gray matrix; 302 cm. 1<2 = 80 degrees. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5670	183				5670	1) PILLOW LAVA, lithology as in unit 2 above. Dark gray unit with same lithology is swirled in 30 cm above contact; 297 cm. 2) Pillow Lava breccia, vesicular, aphyric clasts with distinct chill rinds in gray green clay; 8 cm. Secondary Mineralogy: QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5680	184				5680	1), 3) PILLOW LAVA, <1% olivine phenocrysts in a gray feldspathic matrix; 241, 41 cm. 2) Pillow Lava, (dike?), 1% olivine phenocrysts, 1% plagioclase laths in a dark gray diktytaxitic matrix; 7 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
5690	185				5690	1) PILLOW LAVA, vesicular, <1% olivine-plagioclase intergrowths in a slightly diktytaxitic light gray matrix. 274 cm. Secondary Mineralogy: CALCITE.
5700	186				5700	1), 2), 3), 4) PILLOW LAVA, lithology as in unit 1 above, gold chill rinds and radial fractures at contact; 15, 75, 117, 68 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, GYPSUM/ANHYDRITE, ZEOLITES, QUARTZ CRYSTALS. See next page for description of BOX 187.

Depth		Temp (C)	
Feet	BOX	70 140 210 280	Sn-Cl Zeol. Fe-S Cal. An/Gy An/Si X/Qtz Epi.

[illegible]



## CATALOG OF SOH 2 CORE

Depth	Feet	BOX	Temp (C)	70	140	210	280	Sn-Cl	Fe-S	Co	As	Si	X/Otz	Epi	ROD	Lithology	Descriptions
	5800	197															1) PILLOW LAVA, see previous page for unit descriptions. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite
	5810	198															1), 2), 3), 4), 5), 6) PILLOW LAVA, vesicular 15%, 1 mm, lined with green clay; aphyric gray aphanitic basalt; 10, 37, 35, 28, 56, 23 cm. 7) DIKE, 2% altered olivine microphenocrysts in a dark gray aphanitic matrix; 99 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
	5820	199															1) DIKE, lithology as in unit 7 above; 28 cm. 2), 3), 4), 5), 6), 7), 8), 9) PILLOW LAVA, 1-10% vesicles, pipe vesicles, and vugs; <1% olivine microphenocrysts in a gray diktytaxitic matrix, green clay at contacts; 14, 54, 50, 24, 30, 13, 53, 6 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, CALCITE (?).
	5830	200															1), 2), 3), 4), 5), 6), 7) PILLOW LAVA, vesicular 15%, 1 mm, aphyric gray aphanitic basalt, 2 cm green clay at contacts; 20, 40, 39, 37, 50, 30, 28 cm. Secondary Mineralogy: QUARTZ CRYSTALS, CALCITE; SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
	5840	201															1), 2), 3), 5), 6), 7), 8), 10) PILLOW LAVA, 10-15% vesicles in a gray diktytaxitic matrix, green clay at contacts; 9, 37, 19, 28, 32, 42, 51, 34 cm. 1<2 shows reverse offset. 4) Pillow Lava, 3% plagioclase laths in a dark gray feldspathic matrix; 21 cm. 9) DIKE(?), <1% olivine phenocrysts in a dark gray aphanitic matrix; 7 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, CALCITE (?), ZEOLITES: analcime.
	5850	202															1) 2), 3), 4), 6), 7), 8) PILLOW LAVA, 1%-10% vesicles, <1% olivine phenocrysts in a gray feldspathic matrix, clay at contacts; 6, 28, 31, 48, 46, 42, 78 cm. 5) DIKE, lithology as in unit 9 above; 4 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, CALCITE. XRD: GYPSUM/ANHYDRITE, trace cc (?).
	5860	203															1), 4), 5) Pillow Lava, vesicular 15%, 1 mm, aphyric gray basalt, 2 cm green clay at contacts; 17, 90, 14 cm. 2) DIKE, aphyric, aphanitic dark gray basalt; 10 cm. 2<3 = 70 degrees. 3) DIKE, 2% olivine microphenocrysts, 2% plagioclase laths in a dark gray diktytaxitic matrix; 161 cm. 3<4 = 48 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite. XRD: GYPSUM/ANHYDRITE.
	5870	204															1) Pillow Lava, vesicular 15%, 1 mm; slightly diktytaxitic gray basalt; 14 cm. 1<2 = 25 degrees. 2) DIKE, aphyric, diktytaxitic dark gray basalt; 27 cm. 2<3 = 35 degrees. 3) DIKE, lithology as in unit 3 above; 187 cm. 3<4 = 55 degrees. 4) Hyaloclastite, green clay supporting 10 cm pillows with lithology as in unit 1: 51 cm. 5), 6) DIKE, lithology as in unit 3 above but matrix is aphanitic; 17, 18 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, QUARTZ CRYSTALS.
	5880	205															1), 2) DIKE, lithology as in unit 2 above; 3, 35 cm. 3) PILLOW LAVA, 10% vesicles, <1% olivine phenocrysts in a light gray feldspathic matrix; 242 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
	5890	206															1) DIKE, vesicular <<1%, 1 cm; aphyric diktytaxitic dark gray basalt; 305 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS.
	5900	207															1), 3), 5) DIKE, microvesicular, <1% olivine microphenocrysts in a light gray diktytaxitic matrix; 7, 7, 116 cm. 2), 4) DIKE, 1% olivine phenocrysts and plagioclase laths in a dark gray feldspathic matrix; 56, 4 cm. 6), 7) Pillow Lava, lithology as in unit 3 above; 69, 41 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
	5900	208															6) PILLOW LAVA, see next page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

Depth		Temp (C)	
Feet	BOX	70	140
		210	280
			Sm-Cl
			Zeol.
			Fe-S
			Cal
			An/Gy
			An/Si
			X/Qtz
			Epi.

5900	208				5900	1) 21, 31, 41, 51, 61 PILLOW LAVA, vesicular 15%, 1 mm; aphyric diktytaxitic gray basalt, green clay at contacts; 15, 28, 130, 57, 22, 24 cm. Dark gray aphanitic inclusions at contacts may be dikelets. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5910	209				5910	1) 21, 31, 41 PILLOW LAVA, 50% of vesicles filled with green clay, lithology as in unit 1 above. No measures given. 5) Dike, aphyric, aphanitic, aphanitic gray basalt. 4<5 = 50 degrees. No measure given. Secondary Mineralogy: CALCITE, QUARTZ, FE-SULFIDES: pyrite.
5920	210				5920	1) DIKE, vesicular <1%, 1 mm, vesicles filled with quartz or black clay; aphyric gray basalt becomes diktytaxitic feldspathic downward through box; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
5930	211				5930	1) DIKE, vesicular <1%, 1 mm; aphyric gray diktytaxitic feldspathic basalt; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
5940	212				5940	1) DIKE, aphyric diktytaxitic dark gray basalt; 158 cm. 1<2 = 50 degrees. 2) Dike, aphyric, 2% plagioclase laths in last 30 cm, in a dark gray diktytaxitic matrix; 97 cm. 2<3 = 35 degrees. 3) Pillow Lava, vesicular 15%, 1 mm; aphyric aphanitic gray basalt, volcaniclastite at 2<3; 30 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES.
5950	213				5950	1), 3), 4) Pillow Lava, 75% of vesicles filled with green clay, lithology as in unit 3 above; 31, 23, 59 cm. 1<2 = 55 degrees. 2) Dike, aphyric, aphanitic aphanitic dark gray basalt; 5 cm. 2<3 = 55 degrees. 5) DIKE, aphyric, aphanitic diktytaxitic dark gray basalt; 176 cm. 4<5 = 60 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES.
5960	214				5960	1) DIKE, 0-5% vesicular, aphyric, feldspathic to diktytaxitic gray basalt. Possible off set on fracture; 88 cm. 2) Dike, aphyric, <1% olivine phenocrysts in a dark gray aphanitic to feldspathic groundmass; 115 cm. Intrudes dike 1 and pillow 3. 3), 4), 5) Pillow Lava, 5-10% vesicles, <1% olivine phenocrysts in a light gray feldspathic diktytaxitic groundmass; 14, 47, 26 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES.
5970	215				5970	1), 2), 4), 5), 6), 7), 8), 9), 10), 11) PILLOW LAVA, vesicular 15%, 1 mm with occasional pipe vesicles at the bottom of larger units, 75% of small vesicles filled with green clay, aphyric aphanitic gray basalt, 2 cm green clay at contacts; 20, 36, 18, 46, 56, 40, 27, 9, 13, 7 cm. 3) Dike, aphyric, aphanitic, aphanitic dark gray basalt; 10 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, EPIDOTE, FE-SULFIDES.
5980	216				5980	1) Pillow Lava, lithology as in unit 1 above; 26 cm. 1<2 = 80 degrees. 2) DIKE, aphyric, aphanitic at contact, becomes 3% olivine microphenocrysts altered to gray clay last 60 cm of box, diktytaxitic dark gray basalt; 279 cm. Secondary Mineralogy: CALCITE, SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES.
5990	217				5990	1) DIKE, aphyric, 3% olivine microphenocrysts altered to gray clay in a dark gray diktytaxitic matrix; 134 cm. 1<2 = 75 degrees. 2), 4), 6), 7), 8) Pillow Lava, lithology as in unit 1 above; 50, 24, 28, 17, 19 cm. 2<3 = 40 degrees. 3), 5) Dike, aphyric, <1% plagioclase blades and laths in a dark gray aphanitic matrix; 7, 15 cm. 3<4 = 40 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6000	218				6000	1), 2), 3), 4), 5), 6), 7) PILLOW LAVA, lithology as in unit 1 above; 19, 115, 16, 15, 23, 65, 53 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.



SOH 2

# Scientific Observation Hole Site 2 Elevation 280 ft a.s.l.

Depth Feet	Core Box	Temperature (Celsius)					ROD	Lithology	Descriptions
70	140	210	280	Smeectite-Chlorite Zeolites Fe-Sulfides Calcite	Anhydrite, Gypsum Amorphous Silica Quartz Crystals Epidote				
6000	218								1) PILLOW LAVA, see previous page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6010	219								1), 2), 3), 4), 5), 6) PILLOW LAVA, vesicular 15%, 1 mm; aphyric, aphanitic gray basalt, 2 cm green clay at contacts; 12, 30, 31, 67, 57, 112 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6020	220								1), 2), 3), 4) PILLOW LAVA, lithology as in unit 1 above; 113, 49, 96, 7 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, ZEOLITES: analcime (?), QUARTZ CRYSTALS, FE-SULFIDES: pyrite, EPIDOTE (?), GYPSUM/ANHYDRITE. XRD: gypsum/anhydrite.
6030	221								1), 2), 3), 4), 5), 6) PILLOW LAVA, vesicular 3-5%, <1% olivine microphenocrysts altered to clay in a light gray feldspathic matrix, clay at contacts; 20, 34, 61, 35, 44, 25 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, EPIDOTE, CALCITE, GYPSUM/ANHYDRITE, XRD: gypsum/anhydrite.
6040	222								1), 3), 4), 5), 7) PILLOW LAVA, vesicular 15%, 1 mm at top avascular at bottom; aphyric slightly diktytaxitic gray basalt; 4, 35, 18, 7, 184 cm. 2), 6) Hyaloclastite, pillow clasts in gray clay or calcite; 14, 13 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6050	223								1), 3), 4), 5) PILLOW LAVA, vesicular 1-5%, <1% altered olivine phenocrysts in a light gray feldspathic matrix; 116, 26, 20, 50 cm. 2) Pillow Lava breccia, pillow clasts altered to green clays; 28 cm. 6) Hyaloclastite, dark gray clay with glass shards altering to clays; 30 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, CALCITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
6060	224								1) HYALOCLASTITE, pillow clasts with lithology as below alternating with fine grained hyaloclastite, calcite cement for some bands; 102 cm. 2), 3) Pillow Lava, 2% olivine microphenocrysts altered to black clay, 2% plagioclase laths in a gray aphanitic matrix somewhat altered to smectite; 137, 34 cm. 4) Diike, avascular, 5% plagioclase laths in a dark gray aphanitic matrix; 17 cm. 3<4 = 55 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES: pyrite.
6070	225								1) DIKE, 3% olivine phenocrysts, 2% olivine-plagioclase intergrowths, and 7% plagioclase laths, some altered to black clay, in a light gray feldspathic matrix; 80 cm. 2) Pillow Lava, 3-5% vesicles, <1% olivine phenocrysts, 2% plagioclase microphenocrysts, in a gray feldspathic matrix; 40 cm. 3), 5) Hyaloclastite, pillow clasts, lithology as in unit 2, in green clay, non-crystalline carbonates interbedded; 31, 55 cm. 4) Volcanoclastite, bedded and altered to green clay; 7 cm. 6) Diike, vesicular 1%, <1 mm; <1% olivine phenocrysts and plagioclase laths in a matrix altered to black clay; 64 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6080	227								1) DIKE, lithology as in unit 6 above; 273 cm. 2) Diike, avascular, aphyric dark gray basalt; 1 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES.
6090	228								1) DIKE, lithology as in unit 6 above; 244 cm. 1<2 = 60 degrees. 2) Pillow Lava, avascular, 3% plagioclase laths in a dark gray aphanitic matrix; green clay and angular pillow rubble filled with calcite cement at contact; 30 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES.
6100	229								1), 2), 3), 4), 5) PILLOW LAVA, 3% vesicles, <1% olivine phenocrysts and 2% plagioclase laths in a gray feldspathic matrix; 10, 32, 60, 24, 155 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, and SMECTITE-CHLORITE. See next page for description of BOX 229.

Depth		Temp (C)	
Feet	BOX	70 140 210 280	Sm-Cl Zeol. Fe-S Cal Am/Gy Am/Si X/Otz Epi.

6100	229		6100	<p>1) PILLOW LAVA, microvesicular 1%, &lt;1 mm; &lt;1% olivine phenocrysts and microphenocrysts, &lt;1% plagioclase microphenocrysts in a medium gray feldspathic groundmass, highly altered to black clays; 289 cm. Secondary Mineralogy: AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, SMECTITE-CHLORITE.</p>
6110	230		6110	<p>1), 2), 3), 4) PILLOW LAVA, lithology as in unit 1 above; 178, 18, 41, 46 cm. Contacts average 2 cm. Fine grained volcaniclastite altered to dark green clay. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.</p>
6120	231		6120	<p>1) PILLOW LAVA, lithology as in unit 1 above; 198 cm. 2) Pillow Lava, lithology as in unit 1 above except 75% of microvesicles are filled with white clay; 36 cm. 3) Dike, a vesicular, aphyric very dark gray slightly diktytaxitic basalt; 40 cm. 2&lt;3 = 40 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite. XRD: GYPSUM/ANHYDRITE.</p>
6130	232		6130	<p>1) Dike, &lt;&lt;1% olivine phenocrysts and microphenocrysts in a gray aphanitic groundmass; 99 cm. 2), 3), 4) PILLOW LAVA, microvesicular 1%, &lt;1 mm; &lt;1% olivine phenocrysts and microphenocrysts in a gray feldspathic groundmass; 11, 135, 40 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS, and FE-SULFIDES: pyrite.</p>
6140	233		6140	<p>1) PILLOW LAVA, lithology as in unit 2 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.</p>
6150	234		6150	<p>1) PILLOW LAVA, lithology as in unit 2 above; 174 cm. 2) Dike, a vesicular, 1-3% plagioclase microlaths in a feldspathic to aphanitic groundmass; 23 cm. 3) Hyaloclastite, supporting large (4-7 cm) angular pillow clasts with lithology as in unit 1; 94 cm. Secondary Mineralogy: SMECTITE-CHLORITE.</p>
6160	235		6160	<p>1) Hyaloclastite, lithology as in unit 3 above; 43 cm. 2) PILLOW LAVA, microvesicular 1%, 1 mm; aphyric aphanitic gray basalt. Last 180 cm of unit is a vesicular; 231 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.</p>
6170	236		6170	<p>1) PILLOW LAVA (dike?), a vesicular, &lt;&lt;1% olivine phenocrysts and microphenocrysts in a light gray feldspathic diktytaxitic groundmass; 176 cm. 2), 3) Dike, dense, a vesicular, &lt;&lt;1% olivine phenocrysts and microphenocrysts in a light gray aphanitic to feldspathic groundmass; 11, 110 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.</p>
6180	237		6180	<p>1), 2) DIKE, a vesicular, &lt;&lt;1% plagioclase blades and laths in a gray slightly diktytaxitic matrix; 49, 224 cm. 1&lt;2 = 50 degrees. 3) Dike, microvesicular, &lt;&lt;1%, &lt;1 mm; aphyric gray slightly diktytaxitic basalt; 60 cm. 2&lt;3 = 35 degrees. Secondary Mineralogy: QUARTZ CRYSTALS.</p>
6190	238		6190	<p>1) DIKE, lithology as in unit 3 above; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS.</p>
6200	239		6200	<p>1) DIKE, &lt;1% vesicles, &lt;1% olivine phenocrysts and microphenocrysts in a light gray microcrystalline diktytaxitic groundmass; 286 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, and FE-SULFIDES: pyrite.</p>
	240			<p>1) DIKE, see next page for unit description.</p>



Depth	Temp (C)	
Feet	70	Sn-Cl
80X	140	Zeol.
	210	Fe-S
	280	Cal.
		An/Gy
		An/Si
		X/Qtz
		Epi.

6200						1) DIKE, <1% vesicles, <<1% olivine phenocrysts in a light gray microcrystalline diktytaxitic groundmass; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, and FE-SULFIDES: pyrite.
6210						1) DIKE, vesicular aphyric very slightly diktytaxitic light gray basalt; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6220						1), 3), 5), 6) DIKE, vesicular aphyric aphanitic light gray basalt; 86, 44, 40, 80 cm. 3>4 = 0, 4>5 = 40, 5>6 = 70 degrees. 2), 4) Hyaloclastite, small clasts with lithology as in unit 1 in gray clay; 52, 3 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite altered red.
6230						1), 3) DIKE, <1% vesicles; <<1% olivine phenocrysts in a light gray feldspathic groundmass; 164, 71 cm. 2) Pillow Lava, 1-3% vesicles, 1% olivine phenocrysts in a dark gray altered groundmass; 41 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, and GYPSUM/ANHYDRITE.
6240						1) DIKE, vesicular, aphyric, aphanitic light gray basalt; 81 cm. 2) DiKE, vesicular, <<1% plagioclase laths in a light gray aphanitic matrix; 209 cm. 1<2 = 40 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6250						1) DIKE, vesicular, <1% olivine phenocrysts and plagioclase laths in a light gray feldspathic groundmass; 281 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6260						1) DIKE, vesicular, <<1% altered olivine phenocrysts in a light gray feldspathic groundmass; 248 cm. 2) Pillow Lava, aphyric, 1-3% vesicles filled with smectite in a gray aphanitic to feldspathic groundmass; 32 cm. Secondary Mineralogy: SMECTITE-CHLORITE, GYPSUM/ANHYDRITE and FE-SULFIDES: pyrite.
6270						1), 2), 3), 4), 5), 6), 7) PILLOW LAVA, lithology as in unit 2 above; 3, 26, 32, 31, 29, 150, 12 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6280						1), 5) PILLOW LAVA, vesicular, aphyric, aphanitic gray basalt; 69, 90 cm. 2) Hyaloclastite, small (1 cm) clasts with lithology as above in green clay; 102 cm. 3), 4) DiKE, vesicular, <<1% plagioclase blades and laths in a dark gray aphanitic matrix; 95, 10 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, EPIDOTE.
6290						1), 3), 4), 5), 6), 7) PILLOW LAVA, 1% vesicles filled with smectite, in a light gray, aphanitic, altered groundmass; 27, 90, 26, 94, 20, 20 cm. Secondary Mineralogy: SMECTITE-CHLORITE and FE-SULFIDES: pyrite.
6300						1), 3), 5) Pillow Lava, 3% vesicles, aphyric gray feldspathic basalt altering to smectite; 51, 62, 80 cm. 2), 4) DIKE, vesicular, <1% olivine phenocrysts altering to clays in a medium gray aphanitic matrix; 41, 151 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES:

## CATALOG OF SOH 2 CORE

Depth Feet	BOX	Temp (C) 70 140 210 280	Sn-Cl Fe-S Ca Al An Gy St X/Qtz Epi.	ROD	Lithology	Descriptions
6300	250					2) DIKE, see previous page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, EPIDOITE, GYPSUM/ANHYDRITE, albite (?) or adularia.
6310	251					1) Pillow Lava, aphyric aphanitic gray basalt; 61 cm. 2) DIKE, aphyric diktytaxitic gray basalt; 180 cm. 3) DIKE, 5% plagioclase laths in a dark gray aphanitic matrix; 80 cm. 4) Pillow Lava, lithology as in unit 1, fractured to rubble and altering to smectite; 40 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES, GYPSUM/ANHYDRITE.
6320	252					1) PILLOW LAVA, vesicular 15%, 1 mm; grades to aphyric aphanitic light gray basalt, black clasts with white rims in green clay at contact; 100 cm. 2) Pillow Lava, aphyric light gray aphanitic to diktytaxitic basalt; 174 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite altered red.
6330	253					1) PILLOW LAVA, <1% plagioclase laths in a light gray diktytaxitic matrix, clay at contacts as above; 114 cm. 2) Pillow Lava, vesicular 5%, <1 mm, 100% filled with green clay; aphyric aphanitic light gray basalt; 88 cm. 3) 4) Pillow Lava, aphyric, aphanitic gray basalt; 14, 17 cm. 5) Pillow Lava, vesicular 15%, lithology as in unit 2; 44 cm. Secondary Mineralogy: SMECTITE-CHLORITE, massive CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.
6340	254					1) PILLOW LAVA, lithology as in unit 2 above; 38 cm. 2) Pillow Lava, 5% olivine phenocrysts altered to black clay in an aphanitic gray matrix; 84 cm. 3) 4) 5) Pillow Lava, 1% olivine phenocrysts altered as in unit 2, in a diktytaxitic matrix; 30, 40, 25 cm. 6) Pillow Lava, lithology as in unit 2 above; 47 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
6350	255					1) Pillow Lava, lithology as in unit 2 above; 23 cm. 2) 3) 4) 6) 9) VOLCANICLASTICS, bedded, altered to green clay; 13, 37, 16, 25, 27 cm. 5) 8) 11) Pillow Lava, 15% altered olivine phenocrysts in a blue-black matrix; 23, 22, 13 cm. Unit 5 offset. 7) Carbonate mud and volcanoclastite sand; 130 cm. 10) DIKE, <1% olivine phenocrysts and plagioclase laths in a light gray aphanitic matrix; 74 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS.
6360	256					1) DIKE, lithology as in unit 10 above; 3 cm. 1<2 = 65 degrees. 2) 3) 5) 6) PILLOW LAVA, 30% olivine phenocrysts altered to white clay in a dark gray matrix altered to smectite; 48, 26, 62, 11 cm. 4) 7) Hyaloclastite, altered, calcareous, 2 cm clasts near contacts; 12, 8 cm. 8) DIKE, 10% plagioclase laths in a gray aphanitic matrix; 97 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS.
6370	257					1) DIKE, 1% olivine phenocrysts and 5% plagioclase laths altering to clay in a dark gray matrix; 289 cm. Secondary Mineralogy: QUARTZ CRYSTALS, SMECTITE-CHLORITE, ZEOLITES: analcime.
6380	258					1) DIKE, lithology as in unit 8 above; 79 cm. 1<2 = 80 degrees. 2) Pillow Lava, lithology as in unit 2 above but 10% olivine; 43 cm. 3) Pillow Lava, lithology as in unit 2 above but 20% olivine; 68 cm. 4) Pillow Lava, lithology as in unit 2 above; 26 cm. 5) DIKE, <1% plagioclase laths in a gray aphanitic to diktytaxitic matrix, last 30 cm altered to clay and olivine phenocrysts visible; 80 cm. 4<5 = 50 degrees. Secondary Mineralogy: SMECTITE-CHLORITE.
6390	259					1) DIKE, lithology as in unit 5 above; 59 cm. 2) 4) 6) 7) 8) PILLOW LAVA, lithology as in unit 2 above; 18, 18, 52, 79, 26 cm. 3) 5) Carbonate, mixed with volcanoclastite sand; 5, 12 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
6400	260					1) 2) 3) 4) 5) 6) PILLOW LAVA, lithology as in unit 2 above; 60, 14, 92, 51, 41, 14 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
6400	261					1) PILLOW LAVA, see next page for unit description.



[illegible]

Depth	Feet	BOX	Temp (C)				Sp-Ci	Feol	Co-S	Am/G	Si	X/Tstz	Lpi	R00	Lithology	Descriptions
			70	140	210	280										
6400																1), 2), 3), 4), 5) PILLOW LAVA, picritic, vesicular, 30% olivine phenocrysts "crazed" white, 20% olivine phenocrysts altered to serpentine in a dark gray matrix altered to smectite; 10, 112, 23, 9, 61, 11, 16, 77 cm. Pillow contacts show small (1 mm) green clasts at pillow margins but change abruptly to fine grained white calcareous material which fills voids between pillows. Secondary Mineralogy: SMECTITE-CHLORITE.
6410																1), 3), 4), 5), 6) PILLOW LAVA, lithology as in unit 1 above; 67, 20, 109, 80, 10 cm. 2) DIKE, <1% olivine microphenocrysts and <1% plagioclase microlaths in a light gray aphanitic groundmass; 14 cm. Secondary Mineralogy: CALCITE, GYPSUM/ANHYDRITE.
6420																1) Pillow Lava, lithology as in unit 1 above; 17, 94, 5 cm. Contact 1<2 is fine grained blue green material, 2<3 is reddish gray. 2) Pillow Lava, lithology as in unit 1 above; 94 cm. 3) Pillow Lava, lithology as in unit 1 above; 5 cm. 4) DIKE, vesicular aphyric aphanitic light gray basalt first 3 cm., changes to 10% olivine phenocrysts altered to black clay in a powdery gray matrix completely altered to smectite; 189 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
6430																1) DIKE, vesicular, 20% olivine phenocrysts and microphenocrysts altered to black clay in a powdery gray matrix completely altered to smectite; 150 cm. 1<2 = 55 degrees 2) DIKE, vesicular, aphyric slightly diktytaxitic light gray basalt; 79 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite. XRD: GYPSUM/ANHYDRITE.
6440																1) DIKE, lithology as in unit 2 above; 130 cm. 1<2 = 85 degrees. 2) DIKE, vesicular, 3% olivine phenocrysts, unaltered, 2% plagioclase laths in a diktytaxitic matrix; 175 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.
6450																1) DIKE, lithology as in unit 2 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
6460																1) DIKE, vesicular, 3% plagioclase laths, in a light gray diktytaxitic to aphanitic matrix; 46 cm. 1<2 = 60 degrees. 2) DIKE, vesicular, <1% olivine phenocrysts in a light gray diktytaxitic matrix; 259 cm. Secondary Mineralogy: none.
6470																1) DIKE, vesicular, 1% olivine phenocrysts altered to white and green clays or plucked, in a light gray microcrystalline feldspathic to diktytaxitic groundmass; 225 cm. 2) Pillow Lava (?), picritic, 20% olivine phenocrysts altering to green clay in an altered splotchy gray matrix; 40 cm. Secondary minerals: FE-SULFIDES: pyrite, and SMECTITE-CHLORITE.
6480																1), 3), 5) Pillow Lava, lithology as in unit 2 above; 33, 9, ? cm. 2), 4), 6) DIKE, vesicular, aphyric, aphanitic gray basalt; 9, 24, 108 cm. 1<2 = 45, 5<6 = 8 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrrhotite (?).
6490																1), 3) DIKE, vesicular, <<1% olivine phenocrysts altering to clays in a gray feldspathic groundmass; 202, 68 cm. Intrudes dike 2. 2) DIKE, 1% vesicles filled with smectite, <<1% olivine microphenocrysts in a gray aphanitic groundmass; 18 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite and pyrrhotite.
6500																1) DIKE, see next page for unit description. Secondary Mineralogy: QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

CATALOG OF SOH 2 CORE									
Depth	Box	Temp (C)				Fe-S	Ca	Al	Si
Feet		70	140	210	280	Fe-S	Ca	Al	Si
6500									
271									
6510									
272									
6520									
273									
6530									
274									
6540									
275									
6550									
276									
6560									
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6570									
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6660									
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6670									
288									
6680									
289									
6690									
290									
6700									
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315									
6950									
316									
6960									
317									
6970									
318									
6980									
319									
6990									
320									
7000									

1), 3) DIKE, vesicular, aphyric, slightly diktytaxitic gray basalt; 13, 154 cm. 1<2 = 40, 2<3 = 60 degrees. 2) Pillow Lava, picritic, vesicular, 20% olivine phenocrysts "crazed" white, in a reddish gray matrix altered to smectite; 107 cm. Secondary Mineralogy: QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1), 2) DIKE, vesicular, <1% olivine microphenocrysts altering to clays in a gray diktytaxitic groundmass; 92, 30 cm. 3) PILLOW LAVA, highly altered, 5-7% olivine phenocrysts altering to dark clays in a gray groundmass; 165 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, pyrrhotite, SMECTITE-CHLORITE. XRD: random interstratified trioctal smectite-chlorite (80% chlorite).

1), 3) Pillow Lava, picritic, vesicular, 20% olivine phenocrysts altered to dark gray green clay in a matrix which degenerates to powdery smectite; 56, 17 cm. 1<2 = 50, 2<3 = 70 degrees. 2) DIKE, vesicular, aphyric slightly diktytaxitic light gray basalt; 132 cm. 4) DIKE, vesicular, 15% plagioclase laths in a dark gray aphanitic matrix; 54 cm. Bottom dip = 60 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ, FE-SULFIDES: pyrite, pyrrhotite.

1) DIKE, vesicular, 1% olivine phenocrysts altering to dark clays, <1% olivine-plagioclase intergrowths, 3-5% plagioclase laths altering to clays in a medium gray feldspathic groundmass; 218 cm. 2) Pillow Lava, highly fractured, 5% olivine phenocrysts replaced by smectite in a pale gray aphanitic to feldspathic groundmass; 41 cm. 3) DIKE, <1% olivine microphenocrysts, <1% plagioclase laths and microphenocrysts in a gray aphanitic groundmass; 21 cm. Secondary Mineralogy: QUARTZ CRYSTALS, SMECTITE-CHLORITE, ZEOLITES, FE-SULFIDES: pyrite, pyrrhotite. XRD: low quartz + low albite + ?.

1) DIKE, vesicular, aphyric except last 60 cm. of unit shows small (1 mm) voids which may be plucked microphenocrysts, aphanitic light gray basalt; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES: pyrite and pyrrhotite.

1) DIKE, vesicular, 5% olivine phenocrysts altered to green clay in a gray diktytaxitic matrix; 101 cm. 2), 4) PILLOW LAVA, picritic, 20% olivine phenocrysts and microphenocrysts "crazed" white or iridescent, in a dark gray matrix altered to smectite. Dark veins of matrix outlining olivine aggregates give the unit a "fishnet" appearance; 85, 102 cm. 3) SILL, lithology as in unit 1; 2 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, SMECTITE-CHLORITE.

1), 2) PILLOW LAVA, lithology as in unit 2 above, 1 cm green clay at contact; 138, 152 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, lithology as in unit 2 above. Voids present appear to be vesicles, not plucked phenocrysts; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, picritic, 30% olivine phenocrysts altered to black clay in a dark gray matrix altered to smectite. Box may contain more than one pillow unit but is too altered to see contacts; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, picritic, 30% olivine phenocrysts and microphenocrysts "crazed" white with black aureoles, up to 1.6 cm diameter, in a gray-green matrix altered to smectite; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, picritic, 10-20% olivine phenocrysts replaced by clays in an altered gray green groundmass; 292 cm. Secondary Mineralogy: SMECTITE-CHLORITE.



CATALOG OF SOH 2 CORE													
Depth	BOX	Temp (C)				ROD						Lithology	Descriptions
Feet		70	140	210	280	Sn-Gl	Fe-S	CaI	Al/Si	X/Oz	Epi.		
6600	281												1) PILLOW LAVA, picritic, 10-20% olivine phenocrysts and microphenocrysts replaced by clays in an altered gray green groundmass; 292 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
6610	282												1) Pillow Lava, lithology as in unit 1 above; 102 cm. 2) DIKE, a vesicular, <1% olivine microphenocrysts altering to clays in a gray aphanitic groundmass; 192 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, EPIDOTE, and ZEOLITES: mesolite (?). XRD: pyrite + albite + QUARTZ CRYSTALS (?).
6620	283												1) DIKE, <1% vesicles, <1% olivine microphenocrysts in a gray feldspathic groundmass; 291 cm. Secondary Mineralogy: SMECTITE-CHLORITE, green fibrous ZEOLITES: neolite (?), AMORPHOUS SILICA (?), FE-SULFIDES: pyrite, EPIDOTE, QUARTZ CRYSTALS.
6630	284												1) DIKE, sparsely vesicular, 1%, 5 mm; vesicles filled or lined with quartz crystals, aphyric diktytaxitic gray basalt; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, white fibrous ZEOLITES: natrolite (?), QUARTZ CRYSTALS, abundant FE-SULFIDES: pyrite altering to rust.
6640	285												1) DIKE, very sparsely vesicular <1%, 3 mm, first 120 cm of unit grades to a vesicular; aphyric diktytaxitic feldspathic basalt; 290 cm. Secondary Mineralogy: QUARTZ CRYSTALS.
6650	286												1) DIKE, <1% olivine microphenocrysts altering to clay in a gray diktytaxitic groundmass; 249 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, and FE-SULFIDES: pyrite.
6660	287												1) DIKE, a vesicular, aphyric, diktytaxitic light gray basalt. Unit becomes aphanitic last 30 cm, probably getting close to a contact; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, abundant FE-SULFIDES: pyrite altering to rust.
6670	288												1) Dike, <1% olivine microphenocrysts, <1% plagioclase microphenocrysts in a light gray aphanitic groundmass; 7 cm. 2) PILLOW LAVA, 3% vesicles filled with smectite, 7-15% olivine phenocrysts and microphenocrysts altering to smectite or serpentine in a dark gray aphanitic groundmass altered to clay; 252 cm. Secondary Mineralogy: FE-SULFIDES, SMECTITE-CHLORITE, CALCITE.
6680	289												1) Pillow Lava, picritic, 30% olivine phenocrysts and microphenocrysts altered black in a dark gray altered matrix fractured to rubble; 45 cm. 2) DIKE, microvesicular <1%, <1 mm, <1% olivine microphenocrysts altered black, <1% plagioclase laths in a light gray diktytaxitic matrix; 229 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
6690	290												1) Dike, microvesicular <1%, <1 mm; 1% olivine microphenocrysts, altered black, 3% plagioclase laths, most in bottom 10 cm of unit in a diktytaxitic dark gray matrix; 128 cm. 1>2 = 40 degrees. 2) PILLOW LAVA, picritic, 20% olivine phenocrysts altered black, in a dark gray matrix completely altered to smectite; 158 cm. Secondary Mineralogy: SMECTITE-CHLORITE.
6700	291												1) PILLOW LAVA, 5-7% olivine phenocrysts and microphenocrysts >50% altered to pale green clays, approximately 10-20% plucked, in a gray green matrix altered to clay; 228 cm. Secondary Mineralogy: SMECTITE-CHLORITE. XRD: illite-smectite (70% illite), corrensite or Rich/vermiculite.
6700	292												1) PILLOW LAVA, see next page for unit description. Secondary Mineralogy: FE-SULFIDES: pyrite.

SOH 2

Scientific Observation Hole  
Site 2 Elevation 280 ft a.s.l.

